

Department of Transportation's

*Intelligent Vehicle
Highway Systems
Projects*

February 1993



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INTRODUCTION

The Intelligent Vehicle Highway Systems (IVHS) program consists of a range of advanced technologies and concepts which, in combination, can improve mobility and transportation productivity, enhance safety, maximize the use of existing transportation facilities, conserve energy resources, and reduce adverse environmental effects.

The national IVHS program includes a range of initiatives in the areas of research and development (R&D), system architecture development, operational tests, institutional/policy projects, and deployment projects. The objective of this report is two-fold:

- (1) to describe those IVHS projects funded by the Department of Transportation (DOT) modal administrations including the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), and the National Highway Traffic Safety Administration (NHTSA), and
- (2) to provide those interested in the IVHS program with a progress status using the milestones from the Department of Transportation's IVHS Strategic Plan (December 1992).

MILESTONE: TOOLS AND KNOWLEDGE BASES

OBJECTIVE: Complete the development and acquisition of basic research tools and knowledge bases needed to support development of functional requirements and safety performance specifications for IVHS applications.

FHWA, through its human factors IVHS research program, is currently investigating human factors issues associated with traveler information needs, requirements, and display types. Current research efforts in this area include an investigation into the types of information system functions that will be provided in future vehicles and the relationship between information processing and driver performance. This research effort includes all types of in-vehicle information, and a variety of display modes. Using modeling, simulation, and experimental techniques, an assessment will be made of driver workload and the attendant effects of information on safety, trip time, and driver convenience. Results will be used to produce generic display and control guidelines for information presentation.

Another FHWA research effort will investigate the types of in-vehicle information drivers need in order to improve trip planning and decisionmaking. Using laboratory-based experiments and validation through field testing, this effort will evaluate the interaction between driver and system characteristics under various driving and environmental conditions. The effectiveness of each type of system will be determined, with emphasis on the controls and displays. Human factors guidelines will be developed for use in the development and design of in-vehicle information systems to improve user performance.

FTA is actively investigating the human factors aspects of advanced public transportation system technologies. Through the evaluation of operational tests, FTA is identifying potential problems and solutions to transit-related human factors issues, such as the ease of use of automated schedules and other information systems. FTA is supporting assessments of the effect on bus drivers of technologies such as advanced fare systems, automatic vehicle location systems, vehicle monitoring, and communication systems. Human factors concerns in the transit dispatch and control center will also be analyzed to identify and solve, early on, worker-related problems caused by the introduction of advanced computer and communications systems. Human factors assessments are currently underway in Denver, Colorado, and FTA is working with the Volpe Center on this effort.

The NHTSA program for improving safety is built on a solid foundation of relevant data, including: driving conditions that distinguish collision situations from normal non-collision situations, driver performance in emergency situations, and fundamental capabilities of drivers. These data will be consolidated into an archival knowledge base for driver performance to include data on older and disabled drivers, performance variations across the driving population, driver visibility requirements, the tolerance for workload in the information-enhanced environment IVHS will create, and vehicle cues and feedback that will facilitate safe control of the vehicle. The tools described here will be used for acquiring these data.

NHTSA will build the state-of-the-art National Advanced Driving Simulator (NADS) and develop procedures for its use. The NADS provides the means for carrying out controlled research into how drivers will react in potentially hazardous driving situations, to develop data on driver behavior without putting subjects at risk. This facility is a critical tool for the conduct of IVHS-related human factors research. The University of Iowa has been selected as the site for the NADS, which is anticipated to be operational by FY 1998. In addition, simulated driving scenarios that represent pre-crash experiences will be developed for use in the NADS program.

NHTSA will develop an instrumented, variable performance test vehicle with modifiable properties, as well as portable data acquisition modules that will evaluate vehicle and driver properties in different vehicle types. These tools will enable data collection under real-world conditions. In addition, computerized models of driver-vehicle performance and traffic flow will be used to characterize crash avoidance problems in quantitative terms for analyzing crash avoidance systems. Predictions from these models will contribute to the design of scenarios for the NADS and the development of procedures for evaluating crash avoidance hardware.

NHTSA will also develop and implement a specialized measurement system which will record the driving actions of vehicles in normal use, in order to quantify the vehicle-motion environment (VME). This system will yield data on the location and relative movement of vehicles, fixed objects, road edges, and other potential collision hazards. The sophisticated statistical database that results can be a model for the private sector to use in determining the crash avoidance effectiveness of their products.

ADVANCED TRAVELER INFORMATION SYSTEMS COMMUNICATIONS ALTERNATIVES TEST AND EVALUATION

DESCRIPTION: Investigations into communications technologies and issues associated with IVHS systems will be conducted. Activities will be focused upon identifying and analyzing particular communications technologies for IVHS functions. Investigations will also include communications protocol issues. Preferred communications alternatives will be recommended for specific IVHS functions.

START DATE: To be determined.

END DATE: To be determined.

STATUS: An RFP is scheduled to be issued in May 1993.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: Not yet determined.

CONTACT: Richard Bishop, FHWA R&D, HSR-10, (703) 285-2680

ANALYSIS OF COMPLEX, CONGESTED CORRIDOR LOCATIONS

DESCRIPTION: This study will develop a matrix of how effective geometric and operations improvements are based on simulation experiments using real-world data from five test sites throughout the country. The 5 sites are:

- (1) I-5 Southbound, between S.R 900 and S.R. 18 in Seattle, Wa.
- (2) George Washington bridge and Cross Bronx Expwy Eastbound, New York/New Jersey.
- (3) I-71 Northbound, between I-70 and I-670 in Columbus, Oh.
- (4) I-94 Eastbound, between US 45 and I-43 in Milwaukee, Wi.
- (5) I-494 Eastbound, between Prairie Center Dr. and TH 5 in Minneapolis, Mn .

The study also includes the evaluation of four alternative analysis techniques to determine under which conditions they should be used. The four alternative analysis techniques are:

- (1) the Highway Capacity Manual,
- (2) the FREQ simulation model,
- (3) the FREFLO simulation model,
- (4) the FRESIM simulation model.

START DATE: September, 1988

END DATE: October, 1992

STATUS: The study has been completed and the five site reports, Final Report, Technical Report and Executive Summary have been delivered.

**ESTIMATED TOTAL
PROJECT COST:** \$485,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$485,000

**FEDERALFUNDS
THROUGH FY 92:** \$485,000

CONTRACTOR: JHK & Associates

CONTACT: Stephen L. Cohen, FHWA R&D, HSR-10, (703) 285-2091

ASSESSMENT OF THE EFFECTS OF IN-VEHICLE NAVIGATION SYSTEMS ON DRIVER PERFORMANCE

DESCRIPTION: Analytical and empirical studies are being conducted to provide generic human factors design guidelines for commercial and non-commercial navigation and information systems. In addition, a testing methodology with criteria is being developed to allow evaluation of the safety of drivers' performance when using the systems. This is a joint project between FHWA and NHTSA.

STARTDATE: September, 1989

ENDDATE: May, 1993

STATUS: The contractor has determined the optimal information and presentation modes for several types of ATIS information. Laboratory assessments of both single and integrated function system mockups are presently being conducted to optimize system/driver interfaces.

**ESTIMATEDTOTAL
PROJECTCOST:** \$720,000

**ANTICIPATEDTOTAL
FEDERAL SHARE:** \$720,000

**FEDERALFUNDS
THROUGHFY92:** \$720,000

CONTRACTOR: University of Michigan Transportation Research Institute

CONTACT: Nazemeh Sobhi, FHWA R&D, HSR-30, (703) 2852907

CONGESTION MANAGEMENT SYSTEMS PROTOTYPE

DESCRIPTION: This project is designed to provide technical assistance and guidance to State and local agencies who are required, under the Intermodal Surface Transportation Efficiency Act of 1991, to prepare a congestion management system (CMS). Prototype CMS's would be formulated for different size urban areas to serve as guidance on format, contents, and purpose. The prototype would also be used in courses and seminars designed to educate State and local areas on the CMS requirements contained in the Federal Register.

START DATE: To be determined.

END DATE: To be determined.

STATUS: The request for proposals is scheduled for release by February or March 1993.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Wayne Berman, FHWA Headquarters, HTV-3 1, (202) 366-4069

CRASH AVOIDANCE AND THE OLDER DRIVER

DESCRIPTION: The purpose of this initiative is to analyze the traffic crash experience of older drivers, assess their capabilities and limitations as drivers, and identify and evaluate vehicle design features that will ensure the safety of their driving while accommodating their mobility needs.

START DATE: May, 1993

END DATE: To be determined.

STATUS: In planning stages.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Ron Knipling, NHTSA Headquarters, NRD-53, (202) 366-4733

DESIGN DRIVER DATABASE

DESCRIPTION: The objective of this NHTSA project is to establish a database documenting the behavior and performance of the driving population to provide better information on the range of driver capabilities and limitations to be accommodated in the design of vehicle subsystems. This is a joint project with the Federal Highway Administration.

START DATE: October, 1991

END DATE: March, 1993

STATUS: A final report is being prepared.

ESTIMATED TOTAL PROJECT COST: \$20,000

ANTICIPATED TOTAL FEDERAL SHARE: \$20,000

FEDERAL FUNDS THROUGH FY 92: \$20,000

CONTRACTOR: Transportation Research Board

CONTACT: Mike Perel, NHTSA Headquarters, NRD-52, (202) 366-5675

DRIVER WORKLOAD ASSESSMENT

DESCRIPTION: The purpose of this initiative is to (1) develop a capability to evaluate the effects of high-technology systems (e.g., crash avoidance systems, navigation systems) on driver safety performance; (2) develop standardized driver workload measurement protocols (including instrumentation), obtain baseline workload data, and evaluate high technology systems that are currently being implemented; and (3) identify aspects of system design and operation that can compromise safety, and to obtain data relevant to human factors guidelines for the driver-vehicle interfaces of these systems.

START DATE: July, 1991

END DATE: July, 1994

STATUS: Pilot testing of research methodologies completed.

ESTIMATED TOTAL PROJECT COST: \$790,000

ANTICIPATED TOTAL FEDERAL SHARE: \$790,000

FEDERAL FUNDS THROUGH FY 92: \$790,000

CONTRACTOR: Battelle

CONTACT: Michael Goodman, NHTSA Headquarters, NRD-52, (202) 366-5677

ELECTROMAGNETIC COMPATIBILITY TESTING FOR IVHS

DESCRIPTION: A resource will be established to conduct evaluations of the electromagnetic compatibility of various proposed IVHS communications components, operating singly and in combination. Many of the issues to be investigated will be drawn from the IVHS System Architecture development effort. Sophisticated simulations, anechoic chambers, and antenna test ranges will be employed to perform this testing.

START DATE: To be determined.

END DATE: To be determined.

STATUS: An interagency agreement will be negotiated with a Federal agency or national laboratory.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: James Arnold, FHWA R&D, HSR-10, (703) 285-2974

FUEL CONSUMPTION AND EMISSION VALUES FOR TRAFFIC MODELS

DESCRIPTION: This study will develop fuel consumption and emission values for a representative sample of the passenger vehicle fleet. These values will be incorporated into existing, and future, traffic models enabling the quantification of energy and environmental impacts of IVHS technologies.

START DATE: To be determined.

END DATE: To be determined.

STATUS: An interagency agreement will be negotiated with a Federal agency or National Laboratory in March 1993.

**ESTIMATED TOTAL
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL SHARE:** NA

**FEDERAL FUNDS
THROUGH FY 92:** NA

CONTRACTOR: To be determined.

CONTACT: Alberto Santiago, FHWA R&D, HSR-10, (703) 285-2092

HUMAN FACTORS IN ADVANCED TRAFFIC MANAGEMENT SYSTEMS

DESCRIPTION: ATMS is comprised of those components that integrate traffic detection, communication, and control functions in a dynamic manner to respond to traffic conditions and to increase the efficiency of existing traffic networks. The goal of the current human factors ATMS project is to provide information that focuses on the human factors engineering issues, the human resource capability factors, organizational design issues, and health hazards/system safety issues. Products of this effort include the development of a Human Factors Handbook for Traffic Management Center (TMC) operators and maintainers; a Human Factors Handbook for TMC designers; and a stand-alone first generation human factors research TMC simulator.

START DATE: October, 1992

END DATE: February, 1996

STATUS: Current efforts are underway to identify and define ATMS TMC functional requirements.

ESTIMATED TOTAL PROJECT COST: \$4,216,359

ANTICIPATED TOTAL FEDERAL SHARE: \$4,216,359

FEDERAL FUNDS THROUGH FY 92: \$4,216,359

CONTRACTOR: Georgia Tech Research Institute, Georgia Institute of Technology

CONTACT: Nazemeh Sobhi, FHWA R&D, HSR-30, (703) 285-2907

**HUMAN FACTORS IN
ADVANCED TRAVELER INFORMATION SYSTEMS AND
COMMERCIAL VEHICLE OPERATIONS
DESIGN EVOLUTION**

DESCRIPTION: The major goal of ATIS is to improve the information that is provided to travelers in urban and rural settings, and under normal, congested, inclement, and emergency conditions. The current project will address the impacts of driver interfaces, information type, behavioral factors, and user demographics on the development of specific information subsystems. These subsystems include In-vehicle Routing and Navigation Systems (IRANS), In-vehicle Motorist Services Information Systems (IMSIS), In-vehicle Signing Information Systems (ISIS), and In-vehicle Safety Advisory and Warning Systems (IVSAWS). Applications specific to CVO focus on the information requirements of commercial vehicles and operators. Products of this effort include the development of Human Factors Design Guidelines for in-vehicle ATIS system design, CVO system design, displays common to ATIS and CVO, and displays unique to CVO.

START DATE: October, 1992

END DATE: March, 1996

STATUS: Ongoing efforts include a review of the relevant ATIS/CVO design guidelines and development of experimental plans to investigate driver acceptance of in-vehicle IVHS.

ESTIMATED TOTAL PROJECT COST: \$5251,337

ANTICIPATED TOTAL FEDERAL SHARE: \$5,251,337

FEDERAL FUNDS THROUGH FY 92: \$5,251,337

CONTRACTOR: Battelle Human Affairs Research Center

CONTACT: Truman Mast, FHWA R&D, HSR-30, (703) 285-2404

INSTRUMENTED-TEST-BED VEHICLE

DESCRIPTION: The objective of this project is to acquire an Instrumented Test Bed Vehicle (ITV) featuring adjustable ride and handling characteristics with capability for vehicle control through on-board and off-board computer/communication systems as well as instrumented measurement of driver and vehicle responses. The ITV will provide critical information on driver/vehicle interaction in support of automated highway and other IVHS programs, other crash countermeasure and human factors research, and the validation of the National Advanced Driver Simulator (NADS).

START DATE: June, 1993

END DATE: To be determined.

STATUS: In pre-contractual stage.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Lloyd Emery, NHTSA Headquarters, NRD-5 1, (202) 366-5673

IN-VEHICLE CRASH AVOIDANCE WARNING SYSTEMS: HUMAN FACTORS CONSIDERATIONS

DESCRIPTION: This project will identify driver requirements for effective warning system design and for evaluating the potential of warning systems to help drivers avoid crashes.

START DATE: September, 1991

END DATE: September, 1996

STATUS: Report on preliminary human factors guidelines and research needs is in preparation.

ESTIMATED TOTAL PROJECT COST: \$757,000

ANTICIPATED TOTAL FEDERAL SHARE: \$757,000

FEDERAL FUNDS THROUGH FY 92: \$757,000

CONTRACTORS: Comsis, Castle Rock, University of Central Florida

CONTACT: Michael Perel, NHTSA Headquarters, NRD-52, (202) 366-5675

IVHS IDEAS PROGRAM

DESCRIPTION: The objective of this initiative is to establish a continuing program to identify and explore innovative concepts for Intelligent Vehicle Highway Systems (IVHS) that are proposed by individual researchers both within and outside the usual transportation research community.

START DATE: N A

END DATE: NA

STATUS: A draft solicitation has been prepared and panel members are being identified.

ESTIMATED TOTAL PROJECT COST: \$2,500,000

ANTICIPATED TOTAL FEDERAL SHARE: \$2,500,000 (over 3 year period)

FEDERAL FUNDS THROUGH FY 92: 0

CONTRACTOR: Transportation Research Board

CONTACT: Michael Freitas, FHWA R&D, HSR-10, (703) 285-2421

MODELS TO SIMULATE IVHS OPERATIONS

DESCRIPTION: This activity will modify existing traffic models to simulate IVHS operations such as real-time control strategies, route guidance capabilities, real-time graphics displays, environmental and safety measures of effectiveness, effects of m-vehicle navigation systems, probe vehicle/path selection capabilities, and user interfaces. As a minor effort, this activity will also examine the feasibility and applicability of incorporating advanced analytic techniques (such as image processing, neural networks, parallel processing, control theory, and real-time distributed systems) into the models.

START DATE: To be determined.

END DATE: To be determined.

STATUS: An RFP is scheduled to be issued in February or March 1993.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Alberto J. Santiago, FHWA R&D, HSR-10, (703) 285-2092

QUANTITATIVE CHARACTERIZATION OF VEHICLE MOTION ENVIRONMENT

DESCRIPTION: This project will develop and validate a measurement system that can quantify the specific motions that vehicles exhibit as they move in traffic under the full array of traffic operations. The measurement system will eventually be used to gather information such as reaction to other drivers cutting in front, normal following distance, typical lane change trajectories, and response to inclement weather. This information will provide the foundation for development of IVHS countermeasures that identify the need for intervention and/or collision avoidance instructions to the driver.

START DATE: September, 1992

END DATE: September, 1994

STATUS: A cooperative agreement has been awarded. The design phase has **started**.

ESTIMATED TOTAL PROJECT COST: To be determined.

ANTICIPATED TOTAL FEDERAL SHARE: \$1,400,000 (system development only)

FEDERAL FUNDS THROUGH FY 92: \$1,400,000

CONTRACTOR: University of Michigan Transportation Research Institute (via Cooperative Agreement)

CONTACT: Paul Spencer, NHTSA Headquarters, NRD-52, (202) 366-5668

PORTABLE DATA ACQUISITION SYSTEM FOR CRASH AVOIDANCE RESEARCH

DESCRIPTION: The objectives of this project are to apply state-of-the-art technology and methods to develop an easily-installed, portable instrumentation package and a set of analytical methods/tools to allow driver-vehicle performance data to be collected using a variety of vehicle types.

START DATE: September, 1992

END DATE: January, 1995

STATUS: An Interagency Agreement has been awarded.

ESTIMATED TOTAL PROJECT COST: \$830,000

ANTICIPATED TOTAL FEDERAL SHARE: \$830,000

FEDERAL FUNDS THROUGH FY 92: \$830,000

CONTRACTOR: Department of Energy, Oak Ridge National Laboratory (via Interagency Agreement)

CONTACT: Michael Goodman, NHTSA Headquarters, NRD-52, (202) 366-5677

TRAFFIC MANAGEMENT LABORATORY - PHASE II

DESCRIPTION: This contract will provide support services to develop, implement, and support a critical additional capability to the existing Turner-Fairbanks Highway Research Center Traffic Management Laboratory. This effort will provide an off-line, pre-deployment capability which enables the testing, evaluation, and calibration of newly developed traffic control strategies, support systems, multi-modal transportation strategies, Traffic Management Center hardware/software configurations, as well as the development of a performance trade-off analysis database. This contract will also complement the existing on-site traffic modelling expertise with systems engineering expertise, database technologies, real-time systems, and hardware and software communication expertise.

START DATE: To be determined.

END DATE: To be determined.

STATUS: The request for proposals is scheduled for release by March or April 1993.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Alberto Santiago, FHWA R&D, HSR-10, (703) 285-2092

TRAFFIC MODELING TO SUPPORT ADVANCED TRAVELER INFORMATION SYSTEMS

DESCRIPTION: The scope of this study consists of two parts: (1) design a dynamic traffic assignment/simulation model suitable for developing real-time diversion strategies for in-vehicle route guidance systems and (2) complete the development of the CORFLO simulation model.

START DATE: October 15, 1990

END DATE: March 15, 1993

STATUS: The development of the CORFLO model was completed and released to the public in July, 1992.

The contract for the dynamic traffic assignment/simulation model was awarded to the University of Texas on October 15, 1990. The literature review has been completed including an evaluation of parallel processing computers. The formulation of the dynamic assignment model and the simulator has been completed. The contractor is currently developing a prototype of the independent components of the system to test their computational efficiency and applicability to real-time operation.

**ESTIMATED TOTAL
PROJECT COST:** \$434,016

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$434,016

**FEDERAL, FUNDS
THROUGH FY 92:** \$434,016

CONTRACTOR: University of Texas

CONTACT: Alberto J. Santiago, FHWA R&D, HSR-11, (703) 285-2092

MILESTONE: SYSTEM ARCHITECTURE

OBJECTIVE: Complete development of a national, open IVHS architecture that will provide a framework for deployment of a nationally compatible system, and stimulate development of products to accomplish defined functions.

In the summer of 1992, the Department embarked on a major program to support development of a national, open IVHS architecture. This was in response to program advice from IVHS AMERICA in its role as a utilized Federal Advisory Committee on IVHS. At the heart of the program are contract teams that will work in parallel to define alternative IVHS architectures, each encompassing a set of user services that meet system goals and objectives. These contracts will be underway in 1993. The architectural options developed by the teams will be evaluated against a set of criteria that reflect technical, non-technical, and cost considerations. Through a consensus building process, the number of architectures will be narrowed until the best one emerges. This will occur in 1996.

In parallel with the architecture development contracts, the Department will move aggressively to involve all organizations potentially affected by the establishment of the IVHS architecture. As the contract teams produce interim and final products, a program to inform these groups and reflect their opinions will be conducted. These opinions will greatly influence the evolution process and ensure that the best architecture emerges.

To ensure that each alternative architecture is evaluated thoroughly and fairly, the Department will enter into agreements with National Laboratories to provide technical review and advisory services on the products of the contract teams, and to evaluate the architectures being considered. This will use the talents resident in the National Laboratories in a critical program area, and ensure that unbiased advice is obtained to support important decisions that will affect many different public and private interests.

SYSTEM ARCHITECTURE CONSENSUS BUILDING

DESCRIPTION: The IVHS Architecture Consensus Building Manager (“Consensus Builder”) will support the DOT in an aggressive program to build consensus on a national IVHS architecture. This effort will include arranging and facilitating a series of regional briefings to organizations about the progress of the IVHS architecture technical definition effort, and provide a means for feeding input from these stakeholder organizations back into the IVHS architecture development process.

Contractor services to be provided include: working with the IVHS architecture definition contractors to develop material that is appropriate for this outreach program; arranging and facilitating “focus” group meetings to discuss IVHS architecture issues identified by the architecture development effort; providing logistical services, such as making arrangements for these meetings; and serving as a channel for feeding back stakeholder organizations’ concerns into the IVHS architecture development process.

START DATE: To be determined.

END DATE: To be determined.

STATUS: Tasking is currently being developed.

**ESTIMATED TOTAL
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL SHARE:** NA

**FEDERAL FUNDS
THROUGH FY 92:** NA

CONTRACTORS: To be determined.

CONTACT: Susan Lauffer, FHWA Headquarters, HTV-1, (202) 366-0372

SYSTEM ARCHITECTURE DEVELOPMENT

DESCRIPTION: At the core of the IVHS architecture development program is the work of the several contracted teams that will be defining and refining the candidate architectures. Each team will produce a set of fully defined architectures in terms of information and data flows, based on systematic analysis of a set of critical IVHS goals and objectives. Teams will propose system functions that satisfy the goals and objectives, and a sequencing of the deployment of these functions. Several of the architectures defined during this first phase will then be evaluated in further detail, the product being a system level simulation of one or more promising architectures.

The work of the teams will be managed by a DOT-led technical management team. Regularly-scheduled progress reviews are planned (approximately every two months) at which all materials will be presented and discussed. Periodic formal program reviews will also be held at which materials will be reviewed by an independent Technical Review Team, after which the results will be made available to the public. The products of this effort, as well as the review products and results of discussions, are intended to support the parallel and continual process of building consensus on a national system architecture.

STARTDATE: To be determined.

END DATE: To be determined.

STATUS: The Request for Proposals for candidate system architectures will be released in early 1993.

**ESTIMATED TOTAL
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL SHARE:** N A

**FEDERAL FUNDS
THROUGH FY 92:** 0

CONTRACTORS: To be determined.

CONTACT: Lee Simmons, FHWA Headquarters, HTV-10, (202) 366-2196

SYSTEM ARCHITECTURE MANAGER

DESCRIPTION: The Architecture Manager will work closely with the contract teams involved in the IVHS architecture development effort. The functions of the Manager include supporting the efforts of these teams, providing technical review and advisory services related to their products, and participating in the evaluation of the candidate architectures produced by the teams. Also included in the terms of the agreement are provisions for contract management services, and the performance of various support studies, as needed.

START DATE: January, 1993

END DATE: To be determined.

STATUS: An interagency agreement with the National Aeronautics and Space Administration (NASA) has been executed for IVHS system architecture support from the Jet Propulsion Laboratory (JPL).

ESTIMATED TOTAL PROJECT COST: \$4,000,000

ANTICIPATED TOTAL FEDERAL SHARE: \$4,000,000

FEDERAL FUNDS THROUGH FY 92: 0

CONTRACTOR: Jet Propulsion Laboratory

CONTACT: Michael Schagrin, FHWA Headquarters, HTV- 10, (202) 366-2 180

MILESTONE: RADIO FREQUENCIES

OBJECTIVE: Identify available nationwide radio frequencies to support IVHS deployment, consistent with the national, open architecture.

The radio-frequency (RF) acquisition strategy for IVHS has two aims: (1) to work with the National Telecommunications and Information Administration (NTIA) and the Federal Communications Commission (FCC) to obtain specific dedicated frequencies, suitable for supporting certain baseline IVHS functions on a nationwide basis; and (2) to preserve currently available spectrum and identify new opportunities for sharing communications capacity with emerging telecommunications technologies.

Dedicated IVHS frequencies are very important in the short term because they are desperately needed by existing and planned operational tests that must examine communications-dependent elements of their projects. Eventually, these frequencies could be used to support a range of IVHS communications needs between and among vehicles and the roadside and transportation management centers.

FHWA has been working closely with the NTIA **and** the FCC to set aside frequencies for IVHS in the new 220-222 MHz land mobile band. In 1992, five pairs of frequencies from the government allotment in this band were requested, and **IVHS** was “registered” as a priority national system (which provides protection from interference). These five frequency pairs were expected to be available for use in operational tests by the end of 1992. Steps were also taken to establish an ad hoc technical IVHS subcommittee within NTIA, and an Advisory Committee to FCC for IVHS. These two groups will give IVHS technical staffs direct access to the deliberations of the two U.S. spectrum management organizations, and in **general** facilitate the enunciation of IVHS spectrum needs.

FHWA has also been working actively to identify current and planned communication outlets that have reserve capacity that IVHS can use. Monitoring, study, and evaluation activities are ongoing for emerging services such as low-earth-orbit (LEO) satellite systems and personal communication networks (PCN). Opportunities for new spectrum between 1 and 10 GHz resulting from any reallocations of government spectrum are also being tracked carefully. Recognizing that spectrum is an increasingly valuable national resource, the IVHS architecture and system design activities in the future will

attempt to take advantage of spectrum sharing in these and other areas to the maximum extent possible.

A relevant and very promising case of spectrum sharing is FHWA's FM Broadcast SCA (Subsidiary Communications Authorization) traffic data experiment. This project will develop a high-speed, low-cost, broadcast data link on existing FM "subcarrier" channels for the purpose of distributing high volumes of traffic and other data to large numbers of vehicles. An operational test of such a system will be completed during this period. The resulting verified transmission technique and protocol could then be rapidly and inexpensively deployed through the use of existing commercial broadcast stations and transmitters.

M-IS RADIO FREQUENCY SPECTRUM PLANNING

DESCRIPTION: This is an ongoing project to identify the emerging radio frequency needs of IVHS operational tests and eventual deployment, and to take the necessary steps to ensure that spectrum is available when needed. This involves establishing relationships with the two U.S. radio spectrum management agencies, the Federal Communications Commission (FCC), and the National Telecommunications and Information Administration (NTIA).

START DATE: December, 199 1

END DATE: On-going

STATUS: The Interdepartment Radio Advisory Committee (IRAC), an organization within the NTIA responsible for government spectrum, has allotted the FHWA five nationwide, narrowband frequency-pairs, in the 220-222 MHz band, for experimental use in the IVHS program. The FHWA will maintain administrative control over the use of these frequencies, and intends to share their use with its partners in selected IVHS projects. The development of guidelines for use of these frequencies in IVHS operational tests is underway.

**ESTIMATED TOTAL,
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL S H A R E :** N A

**FEDERAL FUNDS
THROUGH FY 92:** NA

CONTRACTOR: The MITRE Corporation

CONTACTS: Frank Mammano, FHWA R&D, HSR-10, (703) 285-2405

MILESTONE: TRAVELER INFORMATION SYSTEMS

OBJECTIVE: Operationally test and evaluate traveler information systems that provide real-time, multi-modal travel information through a variety of communications media.

FTA and FHWA will jointly support testing and evaluation of a variety of traveler information systems and products to improve the efficiency and cost-effectiveness of both public transportation and automobile/truck travel. Traveler information centers will be established to serve as clearinghouses to coordinate information collection and distribution.

FTA and FHWA will jointly develop and test passenger information systems which reach trip makers at home or work and provide information on transit routes and schedules, traffic conditions, incidents, construction zones, ride-sharing, tolls and fares, park-and-ride facilities, and route planning. Automated telephone, audiotex, and videotex systems will be tested with the goal of providing all transportation information in a given area through a single telephone number. These will complement other home information networks now being explored such as home-shopping, banking, and information systems. Private sector developments in hand-held devices will be encouraged for traveler information system applications.

FTA will develop information systems consisting of electronic and computer display devices located at transit stations, transfer points, and parking lots. These systems will involve interactive traveler input and will accommodate disabled travelers. Complexity will vary, from closed-circuit television monitors providing vehicle arrival and departure information, to large-format touch-sensitive map displays combined with sophisticated algorithms to assist travelers in finding optimal travel routes.

FTA will support the development of information systems for automobiles, transit users, and transit operators. Information displays and communications devices will be developed for vehicles to provide on-board information about routes and schedules, traffic updates, and optimal routing.

In addition to in-vehicle devices, FHWA will pursue advances in use of Highway Advisory Radio (HAR) and Variable Message Signs (VMS) as conduits for delivering traveler information. Many of these devices are currently used as part of freeway management systems or in stand-alone

applications such as airport parking advisories. The coordinated operation of a metropolitan areawide network of VMS and HAR would benefit all motorists without the purchase of new in-vehicle equipment.

FM/SCA PROTOTYPE FOR TRAFFIC INFORMATION BROADCAST

DESCRIPTION: This project involves the design, development, and preliminary testing of a prototype system to broadcast traffic information to mobile receivers via the Subsidiary Communications Authorization (SCA) Traffic Information Channel (STIC). Such a system will allow the use of commercial FM broadcast stations' subcarriers to transmit traffic and other data at rates higher than previously achieved. The data rate for this system will be high enough to support broadcast of individual link travel times (e.g., for routing applications). The completed prototype transmission and reception scheme will be tested, using mostly off-the-shelf equipment, in several diverse areas to assess concept feasibility.

START DATE: April, 1992

END DATE: On-going

STATUS: STIC simulation has been completed, and laboratory development of the prototype hardware and firmware is nearing completion. Negotiations with a variety of FM broadcasters are underway, with at least one urban and one rural broadcaster having expressed interest in participating in field tests.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: The MITRE Corporation

CONTACT: Frank Mammano, FHWA R&D, HSR-10, (703) 285-2405

TRAFFIC MANAGEMENT INFORMATION AND FLEET OPERATION COORDINATION

DESCRIPTION: This study will develop a concept plan and project design for a real-time information service to be provided to travelers in a variety of ways including at bus stops, transfer centers and on transit vehicles. The information sources to be used will include the City of Anaheim, the Orange County Transit District and the California Department of Transportation. A central Traveler Information System will be used. The City of Anaheim has one of California's most advanced traffic management systems and has been selected by Caltrans as a testbed.

START DATE: December, 1991

END DATE: December, 1992

STATUS: In the system design stage.

**ESTIMATED TOTAL
PROJECT COST:** \$100,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$100,000

**FEDERAL FUNDS
THROUGH FY 92:** \$100,000

CONTRACTOR: Caltrans

CONTACT: Denis Symes, FTA Headquarters, TTS-30, (202) 366-0232

TRANSIT NETWORK ROUTE DECISION AID

DESCRIPTION: The purpose of this project is to develop specifications for designing, implementing and evaluating a computerized information system to aid a telephone operator in rapidly identifying useful itineraries for passengers in a mass transit system. Specifically, it would develop a procedure for constructing a decision aid; investigate algorithms and discuss how to extend or specialize them; and develop a plan for decision aid evaluation.

START DATE: September, 1991

END DATE: October, 1993

STATUS: Work has begun in the investigation and analysis of algorithms. Various techniques to extend and specialize them are being developed.

ESTIMATED TOTAL PROJECT COST: \$70,000

ANTICIPATED TOTAL FEDERAL SHARE: \$70,000

FEDERAL FUNDS THROUGH FY 92: 0

CONTRACTOR: University of Michigan, Department of Industrial Operations and Engineering

CONTACT: Sean Ricketson, FTA Headquarters, 'ITS-30, (202) 3666678

BELLEVUE SMART TRAVELER

LOCATION: Metropolitan Seattle, Washington

PARTNERS: FTA, Bellevue Transportation Management Association, University of Washington, City of Bellevue, Washington State DOT

START DATE: October, 1991

END DATE: September, 1994

DESCRIPTION: This project is investigating ways in which mobile communications, such as cellular phones, can be used to make ridesharing (car-pooling and vanpooling), more attractive and is evaluating a Traveler Information System. A set of information-based services for ridematching was developed in Phase I in cooperation with the mobile telecommunications industry in an effort to increase the use of HOV facilities. The initial focus advised selected private auto drivers of rideshare possibilities using mobile communications. Phase II is operationally testing a prototype computer-based, interactive commuter information center in an office building in downtown Bellevue. The center will provide computerized transit information, rideshare matching, and a method to schedule occasional Carpool or Vanpool trips. The technological applications include voice mail, computer-based ridematching, "smart" ID cards, traffic monitoring computers and electronic maps.

STATUS: Phase I determined that there is a potential for the use of cellular telecommunications and voice mail in ridesharing. However, an incentive was not provided for existing carpools/vanpools. It was found that 42 % of "drive-alone" commuters would consider "instant ridesharing."

ESTIMATED TOTAL PROJECT COST: \$144,000

ANTICIPATED TOTAL FEDERAL SHARE: \$144,000

FEDERAL FUNDS THROUGH FY 92: \$144,000

CONTACTS: Ron Boenau, FTA Headquarters, ITS-32, (202) 366-O 195

BOSTON SMARTRAVELER

LOCATION: Boston, Massachusetts

PARTNERS: Project contributors include FHWA, the Massachusetts Highway Department, SmartRoute Systems and the American Trucking Association Foundation. The American Automobile Association and several local radio and television stations will donate advertising and promotion for the project.

START DATE: 1992

END DATE: 1994

DESCRIPTION: The Boston SmarTraveler project will test the public acceptance and potential traffic impacts of a telephone-based audiotext traffic information service. It will also assess the quantity and quality of information obtained from the various data collection methods used to support the service, and gauge the potential market for full privatization of information provision to users.

STATUS: A cooperative agreement was executed between FHWA and the Massachusetts Highway Department in September 1992. A twelve-month operational test is expected to begin in January 1993.

ESTIMATED TOTAL PROJECT COST: **\$3,050,000**

ANTICIPATED TOTAL FEDERAL SHARE: \$1,515,000

FEDERAL FUNDS THROUGH FY 92: \$1,515,000

CONTACTS: Jonathan McDade, Reg. 1, New York, (5 18) 472-4253

CALIFORNIA SMART TRAVELER

LOCATION: Multiple sites in California

PARTNERS: FTA, Aegis Transportation Information Systems, Inc., California Department of Transportation, Division of New Technology and Research

START DATE: October, 1990

END DATE: September, 1994

DESCRIPTION: This project supports the efforts of the California DOT to design, operationally test, and evaluate the California Advanced Public Transportation Systems (CARTS) program for applying Intelligent Vehicle Highway System (IVHS) advanced technology to transit, paratransit and ridesharing. Both the public and private sectors will jointly test an audiotex/videotex-based Advanced Traveler Information System (ATIS) in suburban California. The information system will permit residential and business users to interact using remote computer systems over telephone lines to exchange timely transportation information.

STATUS: The first phase of the project has been completed which evaluated various test sites and technologies. Five sites have been identified for operational design and testing. A draft report has been prepared describing a California Smart Traveler Information Network which uses audiotex and videotex for carp001 matching services.

ESTIMATED TOTAL PROJECT COST: \$1,355,000

ANTICIPATED TOTAL FEDERAL SHARE: \$355,000

FEDERAL FUNDS THROUGH FY 92: \$355,000

CONTACT: Ron Boenau, FTA Headquarters, 'ITS-32, (202) 366-0195

DIRECT

LOCATION: Along 21 miles of I-94 in Detroit, Michigan

PARTNERS: Michigan DOT, FHWA, various private equipment donors including GM, Ford, Chrysler, Delco, Ericsson/GE, REA America

START DATE: 1991

END DATE: 1995

DESCRIPTION: DIRECT (Driver Information Radio Experimenting with Communication Technology) is a 36-month Operational Field Test that will deploy and evaluate several alternative low cost methods of communicating advisory information to motorists. These include use of the Radio Data System (RDS), television subcarrier, Automatic Highway Advisory Radio (AHAR), Low Power Highway Advisory Radio (HAR), and cellular phone call-in.

A Metropolitan Transportation Center will collect traffic information from various sources and provide traffic updates to travelers on an exception basis. Initial experimental testing will involve 30 specially-equipped vehicles; subsequent testing will involve additional vehicles using conventional equipment (AM and cellular phone). Other features of the project include comparison and evaluation of several types of traffic detectors (microwave, infrared, and video, in addition to loops) and incident detection algorithms.

STATUS: DIRECT has recently completed the design phase. Specifications for procurement of all components of the system are being prepared.

ESTIMATED TOTAL PROJECT COST: \$5,000,000

ANTICIPATED TOTAL FEDERAL SHARE: \$2,500,000

FEDERAL FUNDS THROUGH FY 92: \$700,000

CONTACTS: Martin Monahan, FHWA Reg. 5, Illinois, HRA-05, (708) 206-32 18

MILESTONE: ROUTE GUIDANCE AND NAVIGATION SYSTEMS

OBJECTIVE: Complete the first four operational tests and evaluations of route-guidance and navigation systems.

In-vehicle navigation systems are expected to be available by the mid-1990's to provide information to the driver using both video displays and voice outputs to provide electronic maps, route guidance, and vehicle location. These systems would be available to, and purchased by, the motoring public either as standard or optional equipment on new vehicles and as after-purchase installations. More sophisticated systems would achieve greater public benefit by providing real-time information on traffic, road, and weather conditions and by providing route guidance to motorists based upon real-time traffic conditions. They have the potential to reduce travel time through congestion avoidance and route optimization. They can yield benefits in terms of time saved, reduced fuel consumption, and increased safety.

The FHWA, NHTSA, State and local governments, and private industry are conducting operational tests of these systems. The evaluations of these tests will quantify the benefits and costs of these systems, assess their acceptance by the general public, and ensure that they will be deployed in a manner which does not degrade motor vehicle safety.

Four such operational tests will be completed during this period. These include: Pathfinder (California), TravTek (Orlando, Florida), ADVANCE (Chicago, Illinois), and FAST-TRAC (Detroit, Michigan). These tests will provide data by which to evaluate system designs with respect to system architecture, reliability, human factors, safety, user acceptance, and performance. The results of these tests will also assist the private sector in the design and marketing of route guidance and navigation products.

GLOBAL POSITIONING SYSTEMS

DESCRIPTION: The DOT's Research and Special Programs Administration (RSPA) is addressing IVHS issues, both suburban and rural, in relation to Global Positioning Systems (GPS) and the impact of the Federal Radionavigation Plan on implementing IVHS technologies. GPS is expected to be the radionavigation system of choice in IVHS vehicles. Specifically, differential GPS will be necessary to meet the stringent position accuracy requirements of IVHS if Department of Defense policy to degrade GPS position accuracy for non-military users continues. The RSPA is examining the requirements of IVHS for navigation and positioning to determine if differential services to be offered by Coast Guard, FAA, or any other Federal or non-Federal system meets these requirements and thereby avoid requiring FHWA to expend resources to establish their own network.

START DATE: May, 1992

END DATE: September, 1993

STATUS: The 1992 Federal Radionavigation Plan was broadened to incorporate IVHS. VNTSC is currently developing a matrix that will display intermodal GPS requirements, as well as communications and automatic surveillance requirements.

ESTIMATED TOTAL PROJECT COST: \$250,000

ANTICIPATED TOTAL FEDERAL SHARE: \$250,000

FEDERAL FUNDS THROUGH FY 92: \$250,000

CONTRACTOR: Volpe National Transportation Systems Center

CONTACT: Heywood Shirer, RSPA, DRT-20, (202) 366-4355

LINK IDENTIFICATION FORMAT AND MAP DATABASE REQUIREMENTS

DESCRIPTION: This study will work closely with national interests to examine various methods for identifying segments of roadways (links) and develop recommendations for standardizing the information format, content, and accuracy of a nation-wide map database that can be associated with traveler and traffic information systems. A format for uniquely denoting links for any part of the country/North America will be recommended.

START DATE: To be determined.

END DATE: To be determined.

STATUS: An interagency agreement will be negotiated with a Federal agency or National laboratory in February, 1993.

**ESTIMATED TOTAL
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL SHARE:** N A

**FEDERAL FUNDS
THROUGH FY 92:** NA

CONTRACTOR: To be determined.

CONTACT: Frank Mammano, FHWA R&D, HSR-10, (703) 2852405

ADVANCE

LOCATION: Northwest suburbs of Chicago, IL

PARTNERS: FHWA, Illinois Department of Transportation, Motorola, Inc., Illinois Universities Transportation Research Consortium, (IUTRC)

START DATE: 1991

END DATE: 1996

DESCRIPTION: ADVANCE (Advanced Driver and Vehicle Advisory Navigation Concept) is a cooperative effort to evaluate the performance of the first large-scale dynamic route guidance system in the United States. Up to 5,000 private and commercial vehicles in the northwestern suburbs of Chicago will be equipped with in-vehicle navigation and route guidance systems. Vehicles will serve as probes, providing travel time data to a Traffic Information Center. This information will then be transmitted to the equipped vehicles and used to develop a preferred route. The routing information will be presented to the driver in the form of dynamic routing instructions.

STATUS: The initial fleet of 20 test vehicles is being equipped. Baseline data collection will begin in mid 1993.

ESTIMATED TOTAL PROJECT COST: \$40,000,000

ANTICIPATED TOTAL FEDERAL SHARE: \$20,000,000

FEDERAL FUNDS THROUGH FY 92: \$10,523,185

CONTACTS: Robert Rupert, FHWA Headquarters, HTV-20, (202) 366-2194

FAST-TRAC

LOCATION: Oakland County, Michigan

PARTNERS: FHWA, Michigan DOT, Siemens Automotive, GM, Ford, Chrysler, Road Commission for Oakland County, City of Troy, Michigan Bell, Oakland University, University of Michigan

START DATE: 1992

END DATE: **1994**

DESCRIPTION: FAST-TRAC (Faster and Safer Travel through Traffic Routing and Advanced Controls) will combine ATMS and ATIS technologies in Oakland County, Michigan. The Australian SCATS traffic adaptive control system will be installed in Troy, Michigan. Traffic detection for real time traffic control will be provided using Autoscope" video image processing technology. For the ATIS part of the test, vehicles will be equipped with the Siemens Ah-Scout route guidance and driver information system. Infrared beacons will be installed at critical locations in the network to provide for a continuous exchange of real time traffic and route guidance information.

STATUS: Twenty-eight intersections are under SCATS control and testing of the Ah-Scout system has begun.

ESTIMATED TOTAL PROJECT COST: \$13,831,000

ANTICIPATED TOTAL FEDERAL SHARE: \$10,000,000

FEDERAL FUNDS THROUGH FY 92: \$10,000,000

CONTACTS: Martin Monahan, FHWA Reg. 5, Illinois, (708) 206-3218

PATHFINDER

LOCATION: Los Angeles, California

PARTNERS: FHWA, California Department of Transportation, General Motors

START DATE: 1990

END DATE: 1992

DESCRIPTION: Pathfinder is a cooperative effort by Caltrans, FHWA, and General Motors. It is the first U.S. test of the use of an in-vehicle navigation system to provide real-time traffic information to drivers. Pathfinder provides drivers of 25 specially equipped cars with up-to-date information about accidents, congestions, highway construction, and alternate routes as they operate in Los Angeles Smart corridor. A control center manages the communication, detecting traffic density and vehicle speeds (via detectors and by using the Pathfinder vehicles as probes) and transmitting congestion information to equipped vehicles. The information is presented to the driver in the form of an electronic map on a display screen or digital voice.

STATUS: The evaluation report should be available in spring of 1993.

ESTIMATED TOTAL PROJECT COST: \$2,500,000

ANTICIPATED TOTAL FEDERAL SHARE: \$1,000,000

FEDERAL FUNDS THROUGH FY 92: \$1,000,000

CONTACTS: Frank Mammano, FHWA R&D, HRS-10, (703) 285-2405

TRAVTEK

LOCATION: Orlando, Florida

PARTNERS: FHWA, City of Orlando, Florida DOT, General Motors/Hughes, American Automobile Association

START DATE: 1990

END DATE: 1994

DESCRIPTION: TravTek (Travel Technology) represents a public/private partnership involving the City of Orlando, the Florida DOT, FHWA, General Motors, and the American Automobile Association. The goal of TravTek is to provide traffic congestion information, motorist services ("yellow pages") information, tourist information and route guidance to operators of 100 test vehicles equipped with in-vehicle TravTek devices. Route guidance will reflect real time traffic conditions in the TravTek traffic network. A Traffic Management Center will obtain traffic congestion information from various sources and provide this integrated information, via digital data radio broadcasts, to the test vehicles and the sources.

STATUS: TravTek rental operations began in March 1992. The period for collection of evaluation data is scheduled to last 12 months. In addition to the TravTek partners, NHTSA is participating in the TravTek evaluation. System operations continue to be refined, and evaluation data is being collected.

ESTIMATED TOTAL PROJECT COST: \$12,000,000

ANTICIPATED TOTAL FEDERAL SHARE: \$3,000,000

FEDERAL FUNDS THROUGH FY 92: \$2,679,163

CONTACTS: Robert Rupert, FHWA Headquarters, HTV-20, (202) 366-2194

MILESTONE: TRANSIT FLEET MANAGEMENT

OBJECTIVE: Operationally test and evaluate a transit fleet management system in a major metropolitan area.

FTA is supporting the development of transit fleet management systems that use Automatic Vehicle Location (AVL) to determine the position of transit vehicles and report the positions via computer to a dispatch center. Computer aided dispatching is being developed to assist use of the information to make real-time corrections in vehicle routing and scheduling, and to provide passenger information. In addition, FTA is supporting systems that use traffic signal preemption, automatic passenger counting, vehicle condition monitoring, and security devices.

Transit fleet management is key to **the** implementation of IVHS in public transportation. AVL systems integrated with computerized dispatch and information systems will improve the efficiency and productivity of transit fleets without adding new vehicles.

ANN ARBOR SMART BUS

LOCATION: Ann Arbor Transit Authority (AATA), Ann Arbor, Michigan

PARTNERS: FTA, City of Ann Arbor, University of Michigan

START DATE: July, 1991

END DATE: July, 1994

DESCRIPTION: This project will support the Ann Arbor Transportation Authority's conduct of an operational test of the Smart Bus concept. Included are an on-board bus system, a central control system, and a "Smart Card" fare collection system. The on-board system will enable bus operators to know both expected and actual performance in regard to route, location, speed and status of mechanical systems. It will allow control of on-board electronics, such as the fare collection system, destination sign and enunciator. The on-board system will also enable buses to interact with traffic signal preemption devices and to communicate with the central control system. The central control system will then integrate the data from the bus fleet for coordinated supervision, and will also provide real-time transit information to the public. The "Smart Card" fare system will provide a dual farecard/parking pass to encourage auto drivers to ride transit by providing them an easy cost-saving method for fare payment.

STATUS: AATA is negotiating with vendors to develop the bus management system and the smart card fare and parking system.

ESTIMATED TOTAL PROJECT COST: \$2,067,500

ANTICIPATED TOTAL FEDERAL SHARE: \$1,980,000

FEDERAL FUNDS THROUGH FY 92: \$2,300

CONTACTS: Sean Ricketson, FTA Headquarters, TTS-30, (202) 366-6678

CTA (CHICAGO) SMART BUS

LOCATION: Chicago, Illinois

PARTNERS: FTA, City of Chicago Department of Public Works and Department of Streets and Sanitation

START DATE: July,. 1991

END DATE: September, 1994

DESCRIPTION: This cooperative agreement supports data collection and evaluation of an operational test of a Bus Service Management System (BSMS) by the Chicago Transit Authority (CTA). The CTA is in the process of creating a BSMS which includes procuring an Automatic Vehicle Location (AVL) system, a computer-assisted dispatch and control system, real-time passenger information signs, and a traffic signal preemption system. The initial demonstration phase is being funded locally by the Regional Transportation Authority (RTA). In addition to supporting data collection and evaluation, this cooperative agreement is to document the implementation of the BSMS, and to analyze the BSMS human factors element to assess the effects of introducing video terminals and information systems into the transit dispatching environment.

STATUS: An extensive review of hardware and software vendors has been conducted along with a review of AVL and traffic signal preemption specifications. A Request for Proposals was released in Summer 1992. Evaluation of proposals is underway with selection likely in Spring 1993.

ESTIMATED TOTAL PROJECT COST: \$3,640,000

ANTICIPATED TOTAL FEDERAL SHARE: \$490,000

FEDERAL FUNDS THROUGH FY 92: \$72,000

CONTACT: Sean Ricketson, FTA Headquarters, ITS-30, (202) 366-6678

DETROIT TRANSPORTATION CENTER TRANSIT INFORMATION

LOCATION: Detroit, Michigan

PARTNERS: FTA, FHWA, Detroit Department of Transportation

START DATE: June, 1992

END DATE: March, 1994

DESCRIPTION: This is a joint FTA/FHWA project to provide real-time traffic condition information to dispatch centers of public transit agencies in the Detroit area. MDOT's Detroit Freeway Operations Center collects traffic information on 32 miles of freeway through a buried inductive loop system. The information is then graphically displayed on computer monitors by color coding individual freeway segment (link) speeds. This project will demonstrate the ability to provide this information to public and private transit operators inexpensively, and will then monitor performance changes and evaluate the results.

STATUS: The project began in June 1992 with initial orders for computer hardware. Delivery and set-up is expected in Spring 1993.

ESTIMATED TOTAL PROJECT COST: \$100,000

ANTICIPATED TOTAL FEDERAL SHARE: \$50,000

FEDERAL FUNDS THROUGH FY 92: 0

CONTACT: Sean Ricketson, FTA Headquarters, TTS-30, (202) 366-6678

MTA (BALTIMORE) SMART BUS

LOCATION: Baltimore, Maryland

PARTNERS: FTA, Mass Transit Administration (Baltimore)

START DATE: May, 1988 (R&D Project Phase)

END DATE: **May, 1993**

DESCRIPTION: MTA has begun implementation of an Automatic Vehicle Location (AVL) System that provides bus status information to the public while simultaneously improving bus schedule adherence and labor productivity. 50 buses have been equipped with LORAN-C receivers and 800 mhz radios. The buses' location is determined by the receiver and the information is transmitted to a central dispatch center. Off-schedule buses are identified so corrective action can be taken. The system will be expanded to include all 900 Baltimore transit buses and replace Loran-C with GPS for location.

STATUS: An initial deployment of the system to determine its potential is in operation with 50 buses, 4 supervisor automobiles and 2 consoles with map displays. The system involves route/independent tracking. Driver feedback on schedule can be used to control routes. The system is being expanded to include GPS for location, new dispatcher displays and new software.

ESTIMATED TOTAL PROJECT COST: \$2,500,000

ANTICIPATED TOTAL FEDERAL SHARE: \$2,000,000

FEDERAL FUNDS THROUGH FY 92: \$2,000,000

CONTACT: Denis Symes, FTA Headquarters, TTS-30, (202) 366-0232

RTD (DENVER) SMART BUS

LOCATION: Denver, Colorado

PARTNERS: FTA, Regional Transportation District (Denver)

START DATE: September, 1991

END DATE: March, 1994

DESCRIPTION: RTD is installing an Automatic Vehicle Location (AVL) system to provide bus location information to transit dispatchers to increase efficiency, ridership and passenger safety. The location of each bus is determined by a Global Positioning System (GPS) receiver on the bus and is transmitted to a central dispatch center. Off-schedule buses are identified so corrective action can be taken to reroute buses when needed.

STATUS: A contract has been issued for the upgraded Communications and Automatic Vehicle Location System. The system will be installed in the RTD's fleet of 833 buses and 66 supervisory vehicles. Map displays showing each vehicle's location will permit the dispatcher to control the buses and their schedules. In the event of an on-bus emergency, the driver can summon help through a silent alarm that identifies the bus and its location so the police can be directed to the bus. An evaluation of the system is being initiated by the FTA in close cooperation with the RTD. Installation of equipment on all buses is scheduled for completion in June 1993. The project is being expanded to include a transit information system, with kiosks at major terminals and the new airport.

ESTIMATED TOTAL PROJECT COST: \$10,400,000

ANTICIPATED TOTAL FEDERAL SHARE: \$ 8,320,000

FEDERAL FUNDS THROUGH FY 92: \$ 8,320,000

CONTACT: Denis Symes, FTA Headquarters, TTS-30, (303) 366-0232

MILESTONE: FARE COLLECTION AND SMART CARDS

OBJECTIVE: Operationally test and evaluate a cost-effective electronic transit fare collection system that uses an electronic fare medium that is accepted on more than one transportation mode, and can be used to access non-transportation services.

FTA is supporting efforts to develop and test electronic fare collection systems using “smart” cards that have embedded computer chips. FTA has identified several key advantages that electronic fare collection has over traditional fare media including integrating fare collection and third-party billing, increased cash-collection security, reduced fraud and fare evasion, elimination of an exact-fare requirement, allowing peak-period and distance-based fares, and access to extensive ridership data for route planning and marketing.

In addition, smart cards have the capacity for multi-purpose use. FTA is encouraging operational tests of smart cards that can be used by more than one transportation mode. In Ann Arbor, Michigan, FTA is supporting a test of an electronic card system to be used for both parking and transit. FTA has also established system performance requirements, and is working with the public and private sector to develop operational tests of smart cards that will access both transportation and non-transportation services.

ADVANCED FARE PAYMENT MEDIA, I

DESCRIPTION: This is the first of two FTA projects to investigate and research various forms of advanced fare payment media for transit applications. The focus is upon advanced card systems to improve the efficiency of fare collection and provide measurable benefits to the transit provider and rider alike. There will be in-depth descriptions and analyses of all types of advanced media, including infrared, RF/microwave, contact smart cards, proximity cards and others. The operating environment for transit fare payment systems will be defined and system requirements specified. In addition, the project will categorize the merits of different advanced fare media, and comment on the future potential for each. The project will address smart card use both by bus, rail, paratransit, and integrated transit systems, concentrating on transit operations in the eastern half of the country.

START DATE: August, 1991

END DATE: January, 1992

STATUS: The first phase of the project is complete, and advancement into Phase II is dependent on available funds and successful competition against other applicants.

ESTIMATED TOTAL PROJECT COST: \$50,000

ANTICIPATED TOTAL, FEDERAL SHARE: \$50,000

FEDERAL FUNDS THROUGH FY 92: \$50,000

CONTRACTOR: GLH, Incorporated, Falls Church, Virginia

CONTACT: Sean Ricketson, FTA Headquarters, TTS-30, (202) 366-6678

ADVANCED FARE PAYMENT MEDIA, II

DESCRIPTION: This is the second of two FTA projects to investigate and research various forms of advanced fare payment media for transit applications. The focus is upon advanced card systems to improve the efficiency of fare collection and provide measurable benefits to the transit provider and rider alike. There will be in-depth descriptions and analyses of all types of advanced media, including infrared, RF/microwave, contact smart cards, proximity cards and others. The operating environment for transit fare payment systems will be defined and systems requirements specified. In addition, the project will categorize the merits of each. The project will address smart card use both by bus, rail, paratransit, and integrated transit systems, concentrating on transit operations in the West and on the West Coast.

START DATE: March, 1992

END DATE: July, 1992

STATUS: The first phase of the project is complete, and advancement into Phase II depends on availability of funds and successful competition against other applicants.

ESTIMATED TOTAL PROJECT COST: \$50,000

ANTICIPATED TOTAL FEDERAL SHARE: \$50,000

FEDERAL FUNDS THROUGH FY 92: \$50,000

CONTRACTOR: Echelon Industries Incorporated, Diamond, Bar, CA

CONTACT: Sean Ricketson, FTA Headquarters, TTS-30, (202) 366-6678

TWIN CITIES SMART TRAVELER

LOCATION: St. Paul, Minnesota

PARTNERS: FTA, Minnesota Department of Transportation, Metropolitan Transit Commission, University of Minnesota

START DATE: September, 1992

END DATE: April, 1993

DESCRIPTION: The Regional Transit Board is conducting a preliminary study of the potential of smart cards to improve transit service. Four objectives are identified: first, to find the best use of smart cards in fare payment; second, to evaluate the potential of smart cards in an electronic billing system; third, to study the potential of monitoring contractor performance through smart card systems; and fourth, to study smart card potential on standard transit routes.

STATUS: The Regional Transit Board has contracted with Applied Systems Institute, Incorporated to conduct the study. A written report is due Spring, 1993.

ESTIMATED TOTAL PROJECT COST: \$40,000

ANTICIPATED TOTAL FEDERAL SHARE: \$40,000

FEDERAL FUNDS THROUGH FY 92: \$20,000

CONTACT: Sean Ricketson, FTA Headquarters, TTS-30, (202) 366-6678

**MILESTONE:
TRANSPORTATION DEMAND MANAGEMENT**

OBJECTIVE: Operationally test and evaluate applications of IVHS technology to increase the use of High Occupancy Vehicles (HOVs) and increase the efficiency of HOV facilities.

DOT's efforts fall under three areas: applications of traveler information systems, HOV enforcement systems, and congestion pricing through automatic vehicle identification technology.

The DOT is supporting projects to provide travelers with real-time information about traffic and roadway conditions, transit schedules, and car-pool and Vanpool opportunities. Current projects will soon provide commuters with ridematching and transit information at home and at work through telephone, cellular phone, personal computers, fax, and audiotex/videotex terminals. Through traveler information systems commuters will hear about incentives and programs to encourage HOV use. Project sites include Houston, Hartford, New Haven, Bellevue, and several sites in California.

In HOV enforcement, FTA is supporting tests of sensor technology to identify carpools and automatically verify vehicle occupancy levels. Tests of imaging and identification systems are being supported in Dallas, Texas. In Portland, Oregon, FTA is supporting a test using radio frequency tags to identify Carpool vehicles. Smart card technology is being considered to help manage preferential parking facilities for HOVs. DOT will also assist in drafting model local laws and ordinances to help the enforcement of HOV facilities.

In support of the Congestion Pricing Pilot Program established under Section 1012(b) of the ISTEA, DOT will be considering proposals to increase HOV, ride-sharing, and transit facility use through pricing incentives.

HOUSTON SMART COMMUTER

LOCATION: Harris County, Texas

PARTNERS: FTA, FHWA, Texas Department of Highways and Public Transportation, Texas Transportation Institute

START DATE: 1992

END DATE: 1995

DESCRIPTION: This project seeks to develop and evaluate a real-time traffic and transit information system. Four tasks are underway: first, assess the market potential to increase bus, vanpool, and Carpool use by providing traffic information, bus choices, and carp001 options to travelers at home and work; second, evaluate available technologies and identify those most feasible and cost-effective; third, examine various ways of gathering and distributing transit and traffic information to include the identification of roles and costs for the agencies involved, and fourth, identify the project's administrative requirements and projected costs.

STATUS: The concept development phase has been completed. The Metropolitan Transit Authority of Harris County (Houston Metro) is negotiating an Interagency Agreement with the Texas Department of Highways and Public Transportation to define the roles of each party in the operational test portion of the project.

ESTIMATED TOTAL PROJECT COST: \$17,000,000

ANTICIPATED TOTAL FEDERALSHARE: To be determined.

FEDERAL FUNDS THROUGH FY 92: \$2,000,000 FHWA
\$ 500,000 FTA

CONTACTS: Denis Symes, FTA Headquarters, TTS-30, (202) 366-0232

NORFOLK MOBILITY MANAGER

LOCATION: Norfolk, Virginia

PARTNERS: FTA, Tidewater Transportation District Commission (TRT)

START DATE: April, 1989

END DATE: December, 1993

DESCRIPTION: This is a project to operationally test and evaluate how transit and paratransit user subsidies can improve transportation services available to low-income transit riders. Subsidies provided directly to low-income people should encourage private operators to provide better transportation services. Part of the project is to allow TRT to act as a mobility manager through its distribution of "Mobility Vouchers" to employers who, first, contribute to the face value of the vouchers and then, give them to qualified employees as a benefit. Employees can then use the vouchers to pay for the transit service of their choice. In addition to working through employers, the project has included an effort to work with social service agencies, especially in the medical area.

STATUS: In Phase II of this project, TRT implemented a Commuter Check program. This program is based on a federal tax code that allows an employer to subsidize an employee's transit commute on a tax-free basis up to \$21 per month. TRT targeted many of the employers in the beachfront resort industries who have difficulty getting minimum wage employees from low-income areas to overcome transportation barriers to employment. This program has proven to be successful, as indicated by increasing sales. [Note: *recent federal legislation has raised the tax-free limit on transit subsidies to \$60 per month per employee.*]

ESTIMATED TOTAL PROJECT COST: \$600,000

ANTICIPATED TOTAL FEDERAL SHARE: \$500,000

FEDERAL FUNDS THROUGH FY 92: \$500,000

CONTACT: Helen M. Tann, FTA Headquarters, ITS-30, (202) 366-0207

ROGUE VALLEY MOBILITY MANAGER

LOCATION: Medford, Oregon

PARTNERS: FTA, Rogue Valley Council of Governments, Call-a-Ride, Upper Rogue Community Center, Ashland Senior Program, Group Ride Service, Metro, Ashland, Cascade, White City and Courtesy Yellow Cab Companies, Rogue Valley Transportation District.

START DATE: September, 1991

END DATE: March, 1993

DESCRIPTION: This project will demonstrate the Mobility Manager concept to integrate transportation users, providers and funding sources. Advanced electronic technology will be used to record financial transactions and will include "smart" or magnetic-stripe farecards. The initial phase will focus on providing transportation service to the elderly and disabled who are unable to use fixed route transit. Using existing hardware and readily developed software, the second phase will demonstrate the mobility manager concept for frequent transit riders in urban and rural environments. The third phase will lead to participation by the general public.

STATUS: A project steering committee has been organized to assist in the development and management of the project. The participants include transportation providers, human service agencies, the Oregon DOT, a committee of the MPO and a neighboring county. A contractor has been selected to develop and install the software and hardware for the system.

ESTIMATED TOTAL PROJECT COST: \$460,000

ANTICIPATED TOTAL FEDERAL SHARE: \$380,000

FEDERAL FUNDS THROUGH FY 92: \$380,000

CONTACT: Ron Boenau, FTA Headquarters, TTS-32, (202) 3660195

MILESTONE:
TRANSPORTATION MANAGEMENT DATABASE

OBJECTIVE: Define the requirements for a standard database that will serve the transportation management needs of public agencies involved in traffic management, traveler information, and public transportation.

Ongoing research is defining the data requirements for proactive transportation management, focusing on three specific areas: control functions, data analysis, and information dissemination. As these requirements are defined, specifications for databases will be developed. The specifications will allow for the integrated or segregated implementation of the databases depending on the deployment strategies adopted.

In cooperation with private and public organizations, formal database standards will be realized to facilitate development of additional applications/features, guaranteeing local tailoring without jeopardizing national compatibility.

In addition to database standards, FHWA will develop automated means of loading data into the databases, converting data into useful information, and disseminating the information, while considering human factors issues relevant to the needs of the database users: public agencies, private organizations (navigation system developers, fleet managers, etc.), and the public (motorists and travelers). Definition of data requirements and specifications for the database will be completed by 1995; prototype computerized databases will be developed by 1997.

NO PROJECTS FOR THIS MILESTONE

MILESTONE: **TRAFFIC CONTROL SYSTEMS**

OBJECTIVE: Operationally test and evaluate a new generation of traffic control strategies and traffic management tools and techniques that respond to changing traffic conditions.

Within the next five years, FHWA will have completed development of a new generation of traffic management tools. These include development of real-time, traffic-adaptive signal control systems for arterial streets. Ongoing research on smart surveillance systems will enable accurate monitoring of traffic to assess current conditions so that traffic signal timings can be adjusted accordingly. Research will also examine the possibility of predicting traffic fluctuations so that signal timing adjustments can anticipate the onset of congestion.

New freeway incident detection algorithms will be developed to take advantage of recent progress in sensor technology. Furthermore, the ADVANCE operational test in the Chicago suburbs will be evaluating the use of travel time reports from probe vehicles to assist in detecting incidents in an urban arterial network.

New support systems will also be developed to assist system operators in developing, testing, and implementing traffic control strategies to reduce congestion. These systems include data fusion algorithms, various traffic simulation models, and decision support systems, perhaps using artificial intelligence techniques. As these support systems become available, they will be incorporated into ongoing operational tests around the country.

COORDINATED OPERATION OF RAMP METERING AND SIGNAL CONTROL

DESCRIPTION: This study will develop and test through simulation traffic control strategies that coordinate metering signals on freeway ramps and traffic signals on adjacent surface streets. The proposed control strategies will be applied to individual interchanges and freeway corridors.

START DATE: April, 1989

END DATE: August, 1992

STATUS: Review of the final report is currently underway by panel members.

ESTIMATED TOTAL
PROJECT COST: \$474,342

ANTICIPATED TOTAL
FEDERAL SHARE: \$474,342

FEDERAL FUNDS
THROUGH FY 92: \$474,342

CONTRACTOR: Farradyne Systems, Inc.

CONTACT: Henry Lieu, FHWA R&D, HSR-10, (703) 2852410

DEPLOYMENT ISSUES OF SURVEILLANCE SYSTEMS FOR IVHS

DESCRIPTION: This study will investigate the difficult deployment issues associated with existing and emerging IVHS surveillance systems from the following perspectives: (1) cost-effective analysis, (2) compatibility with existing facilities/systems, (3) flexibility to be upgraded, and (4) system malfunction management. Guidance and recommendations for various applications will be prepared.

START DATE: To be determined.

END DATE: To be determined.

STATUS: The request for proposals should be issued by summer 1993.

**ESTIMATED TOTAL
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL SHARE:** NA

**FEDERAL FUNDS
THROUGH FY 92:** NA

CONTRACTOR: To be determined.

CONTACT: Alberto Santiago, FHWA R&D, HSR-10, (703) 2852092

DESIGN OF SUPPORT SYSTEMS FOR ATMS CONTROL CENTERS

DESCRIPTION: The objectives of this contract are to: (1) develop the functional requirements and specifications for the automated support systems required within an ATMS control center; (2) develop representative functional designs of ATMS support systems for areas of different size and levels of ATMS implementation; (3) develop prototypes of support systems of ATMS control centers; and (4) test these prototypes in a controlled environment and in the field.

START DATE: September, 1992

END DATE: August, 1997

STATUS: A literature review and an evaluation of the state-of-the-art has been completed.

ESTIMATED TOTAL PROJECT COST: \$3,072,679 (including cost sharing in the amount of \$130,000)

ANTICIPATED TOTAL FEDERAL SHARE: **\$2,942,679**

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: The contract was awarded to a consortium composed of public, private, and academic organizations. The prime contractor is Loral Aerosys, Inc.

CONTACT: Cesar E. Perez, FHWA R&D, HSR-10, (703) 285-2408

INCIDENT DETECTION ISSUES

DESCRIPTION: The objective of this activity is to examine the entire issue of automatic incident detection on freeways, including:

- 1 - New technology such as expert systems, neural networks, etc.
- 2 - Alternate detection technology such as WADS systems.

In addition, the issue of developing procedures for quantifying the effects of incidents and quantifying the effects of incident management techniques will be examined.

START DATE: To be determined.

END DATE: To be determined.

STATUS: The Request for Proposals was issued in July, 1992. Anticipated award date is March, **1993**.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Stephen L. Cohen, FHWA R&D, HSR-10, (703) 285-2091

NETWORK-WIDE OPTIMIZATION

DESCRIPTION: The objective of this contract is to develop a computer package which will allow users to:

- 1 - coordinate the signal timing and ramp metering functions.
- 2 - develop metering rates for metered freeway on-ramps,
- 3 - optimize signal timing at isolated intersections, on arterials, and in closed networks,

In addition, a WINDOWS based user interface based on a graphical users interface utilizing point-and-click technology will be developed for this package.

START DATE: November 15, 1992

END DATE: November 15, 1995

STATUS: The contract was awarded in November, 1992.

ESTIMATED TOTAL PROJECT COST: \$1,403,000

ANTICIPATED TOTAL FEDERAL SHARE: \$1,403,000

FEDERAL FUNDS TEIROUGH FY 92: \$1,403,000

CONTRACTOR: Farradyne Systems, Inc.

CONTACT: Stephen L. Cohen, FHWA R&D, HSR-10, (703) 2852091

REAL-TIME TRAFFIC ADAPTIVE CONTROL FOR IVHS

DESCRIPTION: This study, to develop a prototype real-time, traffic adaptive signal control system suitable for use in an IVHS environment by 1997, is the first of three studies which will eventually develop four prototypes for laboratory evaluation, from which one will be selected for further development and field evaluation by 1997. This study encompasses the first stage of a long term effort. It is assumed that a single, major contract will be awarded to a consortium composed of State and local DOT's, private industry, and academia.

START DATE: July, 1992

END DATE: July, 1997

STATUS: The contractor is currently defining the specifications for the system.

ESTIMATED TOTAL PROJECT COST: \$4,915,852

ANTICIPATED TOTAL FEDERAL SHARE: \$3,217,382

FEDERAL FUNDS THROUGH FY 92: \$3,217,382

CONTRACTOR: The contract was awarded to a consortium composed of State and local DOT's, industry, and academic organizations. The prime contractor is Farradyne Systems, Inc.

CONTACT: Alberto J. Santiago, FHWA R&D, HSR-11, (703) 285-2092

RESPONSIVE MULTI-MODAL TRANSPORTATION MANAGEMENT STRATEGIES

DESCRIPTION: Within the context of multi-modal transportation management, the objectives of this contract are: (1) identify candidate real or semi-real time strategies and scenarios; (2) determine their usefulness, and feasibility; (3) develop new concepts; (4) evaluate the potential utility and costs of concepts and scenarios; and (5) provide recommendations for additional research, development, and operational test activities.

START DATE: September, 1991

END DATE: September, 1993

STATUS: The contractor has completed the review of current research efforts, the development of evaluation criteria, the recommendation of possible candidate scenarios, and the development of a draft interim report.

ESTIMATED TOTAL PROJECT COST: \$259,530

ANTICIPATED TOTAL FEDERAL SHARE: \$259,530

FEDERAL FUNDS THROUGH FY 92: \$259,530

CONTRACTOR: Bellomo-McGee , Inc.

CONTACT: Aladdin Barkawi, FHWA R&D, HSR-10, (703) 285-2093

TRAFFIC MODELS FOR TESTING REAL-TIME,
TRAFFIC-ADAPTIVE SIGNAL CONTROL LOGIC:
PHASE I

DESCRIPTION: This study will develop modified versions of the TRAF-NETSIM simulation model and the GTRAF graphics software that will enable the interactive, off-line test of real-time, traffic-adaptive signal control methods in a microcomputer environment. The modified software will then be implemented into an operational Urban Traffic Control Systems (UTCS) control center to provide system operators with real-time measures of effectiveness on the performance of the network under UTCS control.

START DATE: September, 1992

END DATE: August, 1996

STATUS: A coordination meeting between this contractor and the contractor developing the real-time, traffic adaptive signal control logic took place on January, 1993. KLD Associates is currently working on completing the literature review and developing hardware/software specifications.

ESTIMATED TOTAL PROJECT COST: \$839,365

ANTICIPATED TOTAL FEDERAL SHARE: \$839,365

FEDERAL FUNDS THROUGH FY 92: \$839,365

CONTRACTOR: KLD Associates, Inc.

CONTACT: Henry Lieu, FHWA R&D, HSR-10, (703) 285-2410

WIDE AREA SURVEILLANCE SYSTEMS

DESCRIPTION: This effort will provide an initial feasibility assessment of promising technical approaches for wide area surveillance systems for IVHS ATMS systems. This long standing system need has not been adequately met and several National Labs have demonstrated various promising approaches. This study will also examine passive versus active detection issues, and explore the feasibility of integrating Wide Area Surveillance Systems with existing surveillance systems.

START DATE: To be determined.

END DATE: To be determined.

STATUS: Interagency agreements with one or more Federal agencies or National laboratories will be negotiated.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Alberto J. Santiago, FHWA R&D, HSR-10, (703) 2852092

CONNECTICUT FREEWAY ATMS

LOCATION: Hartford, Connecticut

PARTNERS: FHWA, Connecticut DOT

START DATE: 1992

END DATE: 1993 (operational)

DESCRIPTION: This ATMS project will evaluate the use of roadside mounted radar detectors in combination with CCTV for incident detection and verification. Also included is an evaluation of compressed video transmitted over leased phone lines.

STATUS: A contract for construction of the freeway surveillance and control elements was awarded in late 1992. Installation will proceed into calendar year 1993.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: **\$350,000**

CONTACT: Jonathan McDade, FHWA Reg. 1, New York, HPP-01, (5 18) 472-4253

GENESIS

LOCATION: Minnesota, Twin Cities

PARTNERS: FHWA, Minnesota Department of Transportation (MnDOT), University of Minnesota Center for Transportation Studies, Motorola

START DATE: February, 1993

END DATE: December, 1995

DESCRIPTION: The Genesis project is a component of Minnesota's statewide Guidestar program. Genesis will evaluate a portable digital personal communications device (PCD) designed to receive various real-time traffic and transit information. The primary objectives of Genesis are:

- to influence individual travel decisions
- to facilitate transit usage
- to determine technical feasibility, and
- to complement and integrate with other Guidestar component systems.

STATUS: Project engineering and evaluation planning are underway.

ESTIMATED TOTAL PROJECT COST: \$16,000,000

ANTICIPATED TOTAL FEDERAL SHARE: \$3,000,000

FEDERAL FUNDS THROUGH FY 92: 0

CONTACT: Martin Monahan, FHWA Reg. 5, Illinois, HEO-05, (708) 206-32 18

SATELLITE COMMUNICATIONS FEASIBILITY

LOCATION: I-95 in Philadelphia, Pennsylvania

PARTNERS: FHWA, Pennsylvania Department of Transportation (PennDOT)

START DATE: 1991

END DATE: 1995

DESCRIPTION: PennDOT has initiated several parallel efforts as part of a long term area-wide traffic and incident management program in the Philadelphia area. Initially there will be segments of a freeway surveillance and control system, including loop detectors, VMS , and CCTV, that will be tied to a temporary operations center. Satellite (VSAT) will be studied as a communications medium.

STATUS: Preparation of the plans, specifications, and estimate (PS&E) for implementation of the system is underway.

ESTIMATED TOTAL PROJECT COST: \$4,400,000

ANTICIPATED TOTAL FEDERAL SHARE: \$2,200,000

FEDERAL FUNDS THROUGH FY 92: \$2,200,000

CONTACT: Carmine Fiscina, FHWA, Harrisburg, PA, (717) 782-4423

SMART CORRIDOR

LOCATION: Los Angeles, California

PARTNERS: FHWA, Los Angeles County Transportation Commission (LACTC), City of Los Angeles

START DATE: 1991

END DATE: 1993

DESCRIPTION: The SMART Corridor is a joint operational project located along 12.3 miles of the Santa Monica freeway corridor in Los Angeles. The objectives of the Smart Corridor are to provide congestion relief, reduce accidents, reduce fuel consumption, and improve air quality. This will be accomplished using advanced technologies to advise travelers of current conditions and alternate routes (using communication systems such as Highway Advisory Radio (HAR), Changeable Message Signs (CMS), kiosks, and teletext), improving emergency response, and providing coordinated interagency traffic management. The freeway systems will be operated by the State and the arterial streets by the City, with coordination provided via voice communications and electronic data sharing.

STATUS: This \$48-million project is under development, and is expected to be fully operational by the Fall of 1993. The project will then be evaluated for effectiveness and applicability to other corridors.

ESTIMATED TOTAL PROJECT COST: \$47,000,000

ANTICIPATED TOTAL FEDERAL SHARE: \$ 1, 100,000

FEDERAL FUNDS THROUGH FY 92: \$ 1,100,000

CONTACT: Jeff Lindley, FHWA Reg. 9, California, HPD-09, (415) 744-2659

TRAVLINK

LOCATION: Minnesota, Twin Cities

PARTNERS: FTA, FHWA, Minnesota Department of Transportation (MnDOT), Twin Cities Metropolitan Council, Metropolitan Transit Commission (MTC), Regional Transit Board (RTB), US West, 3M/Rennix

START DATE: January, 1993

END DATE: January, 1996

DESCRIPTION: The Travlink project is a component of Minnesota's statewide Guidestar program. The Travlink project will combine the concepts of "smart" travelers with "smart" vehicles to promote transit use by improving the quality of transit services and the complementary public information. Users will be provided bus schedules, expected arrival times, and route information from home, workplaces, transit stations, and other convenient locations. Travlink will also use real-time vehicle location data for improved on-time performance and fleet management and as inputs to the Twin Cities' traveler information system.

STATUS: A Travlink Memorandum of Understanding has been signed by the local public sector participants. A consultant has been hired to shape and prioritize IVHS efforts in Minnesota.

ESTIMATED TOTAL PROJECT COST: \$3,800,000

ANTICIPATED TOTAL FEDERAL SHARE: \$1,620,000

FEDERAL FUNDS THROUGH FY 92: 0

CONTACT: Martin Monahan, FHWA Reg. 5, Illinois, HEO-05, (708) 206-3218

IN-FORM

LOCATION: Long Island, New York

PARTNERS: FHWA, New York State Department of Transportation.

START DATE: 1982

END DATE: On-going

DESCRIPTION: The Information for Motorists (INFORM) system is designed to improve motorist travel times along the 40mile central corridor of Long Island. It is the only system in the United States integrating the surveillance and control of three major facilities (Long Island Expressway, Northern State Parkway, and Jericho Turnpike) with adjacent cross and selected parallel arterial streets, to facilitate corridor traffic flow. The freeway and surface street systems are integrated at a Traffic Information Center in Hauppauge, NY. INFORM is staffed and operated by a consultant under contract to the New York State DOT. Currently, Parsons Brinckerhoff and Walter Dunn are operating the System Control Center with New York State DOT oversight.

STATUS: INFORM is operational. A final project evaluation has been completed and accepted by the FHWA. The report is available from NTIS as number FHWA-RD-9 1-075.

ESTIMATED TOTAL PROJECT COST: \$3 1 ,000,000

ANTICIPATED TOTAL FEDERAL SHARE: \$28000,000

FEDERAL FUNDS THROUGH FY 92: \$28,000,000 (FHWA provided \$2 million for feasibility, design, and evaluation. The construction was financed through Federal-aid funding.)

CONTACTS: Jonathan McDade, FHWA Reg. 1, New York, HPP-01, (518) 472-4253

TRANSCOM CONGESTION MANAGEMENT PROGRAM

- LOCATION:** Metropolitan New York City area (including New Jersey, New York and Connecticut)
- PARTNERS:** FHWA, New York Department of Transportation, New Jersey Department of Transportation, Connecticut Department of Transportation, TRANSCOM and other member agencies
- START DATE:** 1991
- END DATE:** 1994 (for incident detection position)
- DESCRIPTION:** TRANSCOM (Transportation Operations Coordinating Committee) is a consortium of 15 transportation and public safety agencies in the New York, New Jersey, and Connecticut area whose goal is to improve inter-agency response to traffic incidents. As a special IVHS-related project, a development effort has been initiated to utilize AVI readers as an incident detection tool. A consultant (Farradyne, Inc.) has developed an analysis algorithm and recommendations for installing a system of readers which allow vehicles equipped with transponders to serve as traffic probes. The test will evaluate the use of this data to determine real-time traffic information such as speed, travel time and the occurrence of incidents. In addition, funds will be utilized for regionwide initiatives for variable message signs, highway advisory radio, and an overall IVHS implementation study for the region.
- STATUS:** Elements of the TRANSCOM congestion management program are in design and implementation phases. Expansion of the motorist advisory system (additional VMS, CCTV, etc.), upgrading TRANSCOM's own computer information systems, and initiation of an overall regional study of IVHS technical, institutional, and operating issues leading to a long-range implementation strategy have been initiated. A contract for the overall regional study is expected to be awarded to a consultant in early 1993. Installation of hardware and software for the AVI incident detection system will begin in 1993.

February 1993

TRANSCOM CONGESTION MANAGEMENT PROGRAM

ESTIMATED TOTAL

PROJECT COST: To be determined.

ANTICIPATED TOTAL

FEDERAL SHARE: To be determined.

FEDERAL FUNDS

THROUGH FY 92: \$9,000,000

CONTACT:

Michael Halladay, FHWA Headquarters, HTV-20, (202) 366-6503

MILESTONE: RURAL APPLICATIONS

OBJECTIVE: Define the requirements for systems that satisfy the needs of travelers in small urban and rural areas.

DOT will support the development of IVHS products and technologies that prove useful in both small urban and rural environments. DOT foresees substantial potential in IVHS for improvements in safety, mobility, and productivity. These applications include traveler information services including information on traffic conditions, public transportation, tourist routing and special events, weather, roadway conditions, and emergency services; in-vehicle signing and roadside hazard warning systems; and commercial vehicle operations.

Research is underway to examine a broad range of rural and small urban environments, categories of travelers, IVHS applications, and advanced electronic and communication technologies. It will also determine the need for information services in these areas and develop the functional requirements for providing them. The feasibility and cost-effectiveness of alternative applications will be assessed. Alternative system designs for the most promising applications and technologies will be developed and evaluated. Engineering prototypes of promising design alternatives will be developed and tested.

Functions **or** features which may be of interest include:

- Systems that disseminate real-time traffic and travel information using low-cost communications techniques such as FM sideband radio transmission.
- Systems that could alert the driver that the vehicle is straying from the travel lane to reduce run-off-road accidents or to detect oncoming obstacles such as stopped or turning vehicles, unprotected railroad crossings and dangerous curves.
- In-vehicle traveler guidance and information systems providing directions to hotels, restaurants, tourist attractions, and general points of interest, as well as advanced weather information.

- Automated “mayday” assistance for stranded motorists unable to call for help.
- Determine the opportunities for applying IVHS technologies to improving emergency medical service (EMS) response times. Critical delays in transmitting information about crashes and their locations to EMS personnel often exacerbate the injury consequences of crashes. This is particularly true in rural areas, where nearly one-third of severe crashes occur. NHTSA will investigate the feasibility of communications systems which will automatically summon an EMS response following a crash, as well as provide reliable data on the location of the crashed vehicle.
- Systems that can help rural transit users by enabling transit providers to operate rural public transportation systems more efficiently. FHWA and FTA will focus on testing and evaluating the use of smaller multi-passenger vehicles which would be dispatched along routes determined from the real-time demand of riders.

IN-VEHICLE SAFETY ADVISORY AND WARNING SYSTEMS (IVSAWS)

DESCRIPTION: Techniques are being investigated for providing in-vehicle warnings for various roadway hazards, at a point sufficiently upstream from the hazard to enable the driver to take appropriate action. Hazard warning transmitters are envisioned which can be deployed either temporarily or permanently. The technical portion of the effort consists of an analysis of potential scenarios for such a system, an assessment of possible benefits, derivation of functional and technical requirements, development of technical system concepts, subsystem level validation of system concepts, and recommendations for an optimal system implementation as part of a total in-vehicle motorist information package. In addition, human factors testing is being conducted to evaluate various Driver Alert Warning Systems.

START DATE: September, 1990

END DATE: Mid 1993

STATUS: The contractor initially proposed a two-way spread spectrum communication link as the baseline communications architecture. However, the results of a separate FHWA effort concluded that this wideband approach was not feasible due to lack of available spectrum. The effort is being modified to re-evaluate the approach based on spectrum availability, false alarm rate, and the use of GPS. Several candidate system concepts based upon a more in-depth requirements definition process will be identified.

ESTIMATED TOTAL PROJECT COST: \$924,111

ANTICIPATED TOTAL FEDERAL SHARE: \$924,111

FEDERAL FUNDS THROUGH FY 92: \$924,111

CONTRACTOR: Hughes Ground Systems Group

CONTACT: Milton Mills, FHWA R&D, HSR-10, (703) 285-2402

RURAL APPLICATIONS OF ADVANCED TRAVELER INF'ORMATION SYSTEMS

DESCRIPTION: This study will develop an Advanced Traveler Information System(s) (ATIS) for rural applications. The research will examine a broad range of rural environments, categories of travelers, ATIS applications, and advanced electronic and communication technologies. The study involves determining the needs for ATIS services in rural and small urban areas and developing the functional requirements for providing them. The feasibility and cost-effectiveness of alternative applications and ATIS related technologies will be assessed. Alternative system designs for the promising applications and technologies will be developed and evaluated. Based upon these analyses, priorities and plans for subsequent prototyping and operational field testing will be developed. An engineering prototype of one or more of the most promising rural ATIS design alternatives will be developed and tested in a limited rural environment.

STARTDATE: **January, 1992**

END DATE: July, 1995

STATUS: Just getting underway; planning focus group discussions to define needs of rural travelers and stakeholders along with willingness to pay for various ATIS functions.

ESTIMATED TOTAL PROJECT COST: \$1,536,000

ANTICIPATED TOTAL FEDERAL SHARE: \$1,308,500

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: JHK & Associates

CONTACT: Davey Warren, FHWA R&D, HSR-10, (703) 285-2426

TRAVEL-AID

LOCATION: Snoqualmie Pass, Washington State

PARTNERS: NHTSA, FHWA, Washington State Department of Transportation (WSDOT), Farradyne Systems, Inc., Westinghouse Electric Corporation

START DATE: November, 1992

END DATE: May, 1996

DESCRIPTION: This project will use variable speed limit signs, variable message signs, and in-vehicle communication and signing equipment to improve safety along a 40-mile stretch of I-90 across the Snoqualmie Pass, a rural area prone to snow, ice and poor visibility. Electronic sensing and equipment will be installed to monitor traffic, speeds and road and weather conditions. This information will help determine the safest speed. Another system, developed by Farradyne, will use eight variable message signs to broadcast warnings about road conditions, accidents, or slow-moving equipment. The project proposes the use of a relatively simple in-vehicle device which will be low cost with the primary function to display a text message to the motorist. The message would be accompanied by an alert signal to inform the motorist that a message is available. Up to 200 vehicles will be equipped with devices to deliver information similar to that displayed from the roadway VMS system.

STATUS: System design is underway.

ESTIMATED TOTAL PROJECT COST: \$4,986,291

ANTICIPATED TOTAL FEDERAL SHARE: \$1,828,525

FEDERAL FUNDS THROUGH FY 92: \$1,579,525

CONTACTS: Stephen Clinger, FHWA Headquarters, HTV-20, (202) 366-2160

OPERATIONAL TESTS OF SYSTEMS TO ENHANCE EMERGENCY MEDICAL SERVICE RESPONSE

DESCRIPTION: The objectives of this project are to (1) investigate the feasibility of equipping motor vehicles and emergency medical service (EMS) dispatch centers with high-technology systems to enhance EMS response, e.g., a communications system for automatically summoning EMS response following a crash and providing reliable data on crash location, especially in rural areas and (2) conduct operational tests of systems to improve EMS response. The systems tested will have the capability to automatically request emergency assistance.

START DATE: To be determined.

END DATE: To be determined.

STATUS: In planning stages.

**ESTIMATED TOTAL
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL SHARE:** N A

**FEDERAL FUNDS
THROUGH FY 92:** NA

CONTRACTOR: To be determined.

CONTACT: Art Carter, NHTSA Headquarters, NRD-51, (202) 366-5669

MILESTONE: COMMERCIAL VEHICLE APPLICATIONS

OBJECTIVE: Complete three operational tests and evaluations of systems designed to achieve efficiencies in the operation of commercial vehicles.

Research is underway to identify systems that could be used to automate or streamline the processes currently used to issue and verify commercial vehicle credentials. Those systems determined to be feasible will be tested as prototypes in follow-up efforts. These prototype systems will be fully evaluated in operational tests which are expected to be conducted in the next five years of the program. Two operational tests, CRESCENT and ADVANTAGE I-75, are in the process of testing preliminary conceptual designs for credential (tax and registration) verification systems. This will result in tested system designs that will guide the future deployment of a national system of electronic credential checking and automated weigh stations and ports-of-entry for commercial vehicles.

Research is also underway to determine how advanced technology could enhance the commercial vehicle inspection process through improved vehicle screening and selection tools, and real-time vehicle and driver monitoring systems. This ongoing research will develop prototype system designs as part of future operational tests.

ADVANTAGE I-75

LOCATION: I-75 through Florida, Georgia, Tennessee, Kentucky, Ohio, Michigan, and Ontario

PARTNERS: FHWA, Florida, Georgia, Tennessee, Kentucky, Ohio, Michigan, Ontario, Motor Carrier Industry

START DATE: 1991

END DATE: 1995

DESCRIPTION: Advantage I-75 represents a multi-state partnership of public and private sector interests along the I-75 corridor. The project will facilitate motor-carrier operations by allowing transponder-equipped and properly documented trucks to travel any segment along the entire length of I-75 at mainline speeds with minimal stopping at weigh/inspection stations. Pre-Clearance decisions at downstream stations will be based on truck size and weight measurements taken upstream and on computerized checking of operating credentials in each State. Advantage I-75 features the application of off-the-shelf technology and decentralized control, with each State retaining its constitutional and statutory authority relative to motor carriers and their operations.

STATUS: The preliminary design phase of this project is complete. A system manager is working on the final design. System procurement should begin in early 1993.

ESTIMATED TOTAL PROJECT COST: \$10,958,000

ANTICIPATED TOTAL FEDERAL SHARE: **\$3,500,000**

FEDERAL FUNDS THROUGH FY 92: \$1,879,000

CONTACTS: Patricia Harrison, FHWA Region 4, HTE-04, (404) 347-4075

HELP/CRESCENT

- LOCATION:** British Columbia, Washington, Oregon, California, Arizona, New Mexico, Texas
- PARTNERS:** FHWA, Arizona DOT, California DOT, Colorado DOT, Idaho DOT, Iowa DOT, Minnesota DOT, Nevada DOT, New Mexico SHTD, Oregon DOT, Pennsylvania DOT, Texas SDHPT, Utah DOT, Virginia DOT, Washington State DOT, Motor Carrier Industry, Transport Canada
- START DATE:** 1991
- END DATE:** 1993
- DESCRIPTION:** HELP (Heavy Vehicle Electronic License Plate Program) is a multistate, multi-national research effort to design and test an integrated heavy vehicle monitoring system that uses Automatic Vehicle Identification (AVI), Automatic Vehicle Classification (AVC), and Weigh-In-Motion (WIM) technology. The demonstration phase of HELP is known as the Crescent project. The Crescent includes approximately 40 equipped sites ranging from British Columbia southward along I-5 to California and then eastward along I-10 to Texas, branching onto I-20. Data gathered from the WIM, AVI and AVC is processed by a central computer, and then used by the state governments for credential checking, weight enforcement, and planning information and by the motor carrier industry for fleet management purposes. HELP's ultimate goal is to have a system in which a legal truck can drive through the entire network without having to stop at weigh stations or ports-of-entry.
- STATUS:** AVI, WIM, and AVC equipment was installed at sites in Washington, Oregon, California, Texas, New Mexico and Arizona as part of Phase IB and Phase II efforts. Approximately 2,000 trucks are equipped with transponders. During Phase III, the operational and current phase, the performance of the integrated system and the benefits to the State agencies and the motor carriers is being evaluated.

HELP/CRESCENT

**ESTIMATED TOTAL
PROJECT COST:** \$21 ,000,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$5,850,000

**FEDERAL FUNDS
THROUGH FY 92:** \$5,000,000

CONTACTS: Ed Kashuba, FHWA Headquarters, HPM-30, (202) 366-0175

PASS

LOCATION: Ashland Port-of-Entry, Northbound I-5

PARTNERS: FHWA, Oregon DOT, Motor Carrier Industry

START YEAR: 1992

**APPROXIMATE
ENDING YEAR:** 1995

DESCRIPTION: PASS (Port-of-Entry Advanced Sorting System) is a test of mainline sorting at Oregon's Ashland Port-of-Entry on northbound I-5. The project will examine integrating AVI, WIM, AVC and on-board computers (OBC) to identify, weigh, classify and direct selected heavy vehicles in advance of weigh stations and ports-of-entry. Legally operating trucks participating in the project will be directed, by the use of an in-vehicle device, to bypass the port and the static scale weighing process, resulting in time savings for both the carrier and the port personnel.

STATUS: In August, 1992 the Oregon Department of Transportation issued a Request for Proposals in order to select a contractor that will provide system design; equipment procurement and installation; integration of the WIM, AVI, OBC and two-way communication system; testing; and evaluation. Once the contractor is selected, system design will begin.

**ESTIMATED TOTAL
PROJECT COST:** \$572,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$350,000

**FEDERAL FUNDS
THROUGH FY 92:** \$350,000

CONTACTS: Ed Fischer, FHWA Reg. 10, Oregon, HEO-010.6, (503) 326-2071

MILESTONE: COMMERCIAL VEHICLE NETWORK

OBJECTIVE: Develop a strategy for implementation of automated commercial vehicle regulatory and safety inspection systems that integrates databases being developed for safety, uniformity, and size and weight.

In order to pre-clear commercial vehicles at mainline speeds on a national network, three databases must be integrated and accessible on a real-time basis by many users. Those databases are: 1) tax and registration, 2) safety, and 3) size and weight.

A number of activities are already underway. First, Congress has required that all States be members of the International Registration Plan and the International Fuel Tax Agreement by 1996. These two initiatives will provide a uniform national database. Second, through FHWA's Safetynet, a database exists that includes safety information on carriers. Third, under size and weight, many States are entering into agreements with neighboring States for issuing permits based upon maximum size and weight. Also, FHWA is currently charged with determining a way to link vehicle registration with safety fitness. All these activities will provide the databases to be used for IVHS applications.

FHWA will ensure that these databases are compatible and accessible, and that information can be retrieved in real-time. As systems in weigh stations and ports-of-entry come on-line, they will need immediate access to these databases. Also, FHWA will assure that information received on the highway can be transmitted to these databases so that pertinent records can be accessed as soon as they are received by the database. FHWA will prepare a plan outlining the steps for implementation of an integrated system that provides the links and access among these databases and the roadway in real-time.

AUTOMATIC FUEL TAX RECORD KEEPING SYSTEMS

DESCRIPTION: This study will, through cooperation with the appropriate regulatory agencies, identify the vehicle mileage and other record keeping requirements for fuel tax and vehicle registration, examine alternative technologies for automating these requirements, and develop preliminary systems designs that could be evaluated in future operational tests.

START DATE: To be determined.

END DATE: To be determined.

STATUS: The Request for Proposals is scheduled to be issued in spring 1993.

**ESTIMATED TOTAL
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL SHARE:** NA

**FEDERAL FUNDS
THROUGH FY 92:** NA

CONTRACTOR: To be determined.

CONTACT: Michael Freitas, FHWA R&D, HSR-10, (703) 285-2421

COMMERCIAL VEHICLE SAFETY SYSTEMS

DESCRIPTION: The objective of the agreement with Sandia National Laboratories is to provide technical support activities related to the identification, development, and evaluation of various technologies and systems as they apply to commercial vehicle safety and operation.

START DATE: July, 1992

END DATE: July, 1994

STATUS: Research has been initiated to explore the opportunities for applying advanced technologies towards the improvement of the truck inspection process.

ESTIMATED TOTAL PROJECT COST: \$1 ,000,000

ANTICIPATED TOTAL FEDERAL SHARE: \$1 ,000,000

FEDERAL FUNDS THROUGH FY 92: \$1 ,000,000

CONTRACTOR: Sandia National Laboratories

CONTACT: Michael Freitas, FHWA R&D, HSR-10, (703) 285-2421

DEVELOPMENT OF COMPATIBLE TOLL COLLECTION AND TRUCK NETWORK SYSTEMS

DESCRIPTION: This study will review current and planned automatic toll collection and truck network systems, operations and specifications, both in the United States and internationally; identify common system elements; and determine advantages and disadvantages of the various systems and operations. The study will develop and assess various options for developing compatible toll collection and truck network operations nationwide. The goal is to pursue a system where transponder equipped trucks with proper credentials will be able to pass non-stop throughout the country.

START DATE: To be determined.

END DATE: To be determined.

STATUS: A Request for Proposals is scheduled to be issued in February or March 1993.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Michael Freitas, FHWA R&D, HSR-10, (703) 285-2421

OPERATIONAL PRACTICES FOR AUTOMATED TRUCK EN-FORCEMENT FACILITIES

DESCRIPTION: This study will review the designs and operation of modern truck enforcement sites, including those which have been retrofitted as part of a major operational test. These designs and operations will be assessed and used to develop general design guidelines for these facilities.

START DATE: To be determined.

END DATE: To be determined.

STATUS: A Request for Proposals is scheduled to be issued in February **or March 1993.**

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Charles Stockfisch, FHWA Headquarters, HTA-32, (202) 366-8039

**SYSTEMS PLANNING
FOR AUTOMATED COMMERCIAL VEHICLE LICENSING
AND PERMITTING SYSTEMS**

DESCRIPTION: The objective of this study is to develop a systems plan for the development of various automated licensing and permit compliance and verification systems. This study will include all the necessary activities leading up to the actual hardware and software design for such systems. The study will not include any actual system design or testing efforts.

START DATE: May, 1992

END DATE: August, 1994

STATUS: Work has begun to identify and classify the various motor carrier regulatory requirements, and to determine the current agreements, projects, etc. that are intended to reduce the regulatory burden on motor carriers.

ESTIMATED TOTAL PROJECT COST: \$420,000

ANTICIPATED TOTAL FEDERAL SHARE: \$420,000

FEDERAL FUNDS THROUGH FY 92: \$420,000

CONTRACTOR: Cambridge Systematics, Inc.

CONTACT: Michael Freitas, FHWA R&D, HSR-10, (703) 2852421

COMMERCIAL VEHICLE OPERATIONS INSTITUTIONAL ISSUES STUDIES

DESCRIPTION: This effort recognizes that the identification and resolution of institutional issues is important for the deployment of the IVHS Commercial Vehicle Operations program. Up to \$50,000 is being provided to each State to identify institutional issues that would impede or prevent the achievement of national CVO goals. Working groups will facilitate discussions, and a report will be prepared detailing findings.

START DATE: September, 199 1

END DATE: On-going

STATUS: The following States are participating in CVO studies: Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, the District of Columbia, Florida, Georgia, Idaho, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

ESTIMATED TOTAL PROJECT COST: To be determined.

ANTICIPATED TOTAL FEDERAL SHARE: To be determined.

FEDERAL FUNDS THROUGH FY 92: \$1,155,000

CONTRACTOR: Various

CONTACT: Denise Bednar, FHWA Headquarters, HTV-20, (202) 3666143

MILESTONE: COLLISION AVOIDANCE

OBJECTIVE: Complete the identification and analysis of the most promising opportunities for IVHS collision avoidance systems, and complete the first set of performance specifications for systems that can augment driver capabilities to avoid collisions.

In anticipation of the deployment of active IVHS safety technologies in motor vehicles, it is important to define both the crash avoidance needs currently posed by the operation of conventional vehicles, as well as the potential for IVHS technologies to enhance the crash avoidance characteristics of vehicles and the driving experience. By studying accident records for precrash circumstances, it will be possible to identify critical driving hazards. IVHS countermeasures that address these hazards can then be identified and performance specifications can be developed for them. In support of this effort, NHTSA will undertake several activities over the next five years.

First, NHTSA will define accident-causal factors that can be addressed by active IVHS safety technologies. Beginning with a detailed analysis of contemporary accident records, target crash modes and conditions will be identified, so that countermeasures can be pursued. Examples of the crash types being addressed are: rear-end, road departure, backing, intersection, and lane change. In addition, generic driving hazards, such as night/fog vision limitation, slippery roads, driver impairment/recklessness and component malfunction, are being analyzed. These studies will be completed by 1994 and the findings will be used to formulate detailed plans for future research and to refine analytical models and performance specifications. This work will also determine safety improvement opportunities that IVHS technologies can provide to older drivers by identifying older driver performance capabilities and limitations, driving patterns, and crash circumstances. The data will be used to link crash experiences with apparent performance deficiencies, and to identify promising countermeasures that could mitigate these deficiencies.

Second, NHTSA will evaluate the state of IVHS technologies that could contribute to crash avoidance products. This effort will include several categories of technologies:

- Assess the performance of collision avoidance systems that are currently available.

- Assess technologies that provide sensing, processing, and driver interface. This will include review of aerospace and defense systems and their potential applicability to automotive products.

Finally, one of NHTSA's key responsibilities is to demonstrate that advanced technologies can practicably enhance the crash avoidance performance of motor vehicles. This will be demonstrated over the next five years through active involvement in the testing of IVHS systems. In order to establish a basis for evaluating the effectiveness of these systems, NHTSA will develop performance guidelines and evaluation techniques, including methodologies for estimating benefits for crash avoidance technologies. The specific guidelines and techniques will be determined by the specific crash scenario (e.g., rear-end, road departure, backing collision, etc.) that the system is designed to address. These guidelines and techniques will serve as the basis for evaluating the safety impact of existing products, and as design targets for the development of future products. **They will also assess the opportunities for developing anticipatory sensing systems that could mitigate injury in a crash.**

ANALYSIS OF EXISTING ACCIDENT DATABASES

DESCRIPTION: The goals of this project are to (1) analyze existing NHTSA and state accident databases to determine vehicle, driver, and environmental contributing factors (and their interactions) and characteristics of target crashes of conventional and IVHS crash avoidance countermeasures and (2) assess the effects of existing vehicle design features on the incidence and severity of crashes in the "real world."

START DATE: Continuing effort

END DATE: On-going

STATUS: Drafts have been prepared for problem size assessment and statistical description of rear-end, road departure, and backing crashes.

ESTIMATED TOTAL PROJECT COST: \$70,000 / year

ANTICIPATED TOTAL FEDERAL SHARE: Not yet determined

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: Information Management Consultants

CONTACT: Ron Knipling, NHTSA Headquarters, NRD-53, (202) 366-4733

DROWSY DRIVER MONITOR

DESCRIPTION: This project will lead to the development of vehicle-based countermeasures that will monitor driver status/performance, detect degraded performance, and provide a warning signal or other countermeasure to prevent its continuance. The current program will develop vehicle-based detection algorithms for **reduced** driver performance (e.g., symptomatic of drowsiness/fatigue).

START DATE: September, 1991

END DATE: September, 1994

STATUS: Measurement techniques undergoing pilot testing.

ESTIMATED TOTAL PROJECT COST: \$400,000

ANTICIPATED TOTAL FEDERAL SHARE: \$400,000

FEDERAL FUNDS THROUGH FY 92: \$400,000

CONTRACTOR: Virginia Polytechnic Institute (via Cooperative Agreement)

CONTACT: Ron Knipling, NHTSA Headquarters, NRD-53 (202) 366-4733

**INDEFINITE QUANTITY CONTRACT, COMMUNICATIONS,
ELECTRONIC CONTROLS, AND COMPUTERS**

DESCRIPTION: The purpose of this initiative is to provide technical support to NHTSA in the areas of communications, electronic controls, and computers. This requires design, development, and analysis as well as the acquisition of test results, evaluations, alternative solutions, and other pertinent information in these areas.

START DATE: March. 1993

END DATE: To be determined.

STATUS: In contractual negotiation.

**ESTIMATED TOTAL
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL SHARE:** N A

**FEDERAL FUNDS
THROUGH FY 92:** NA

CONTRACTOR: To be determined.

CONTACT: Jose Bascunana, NHTSA Headquarters, NRD-5 1, (202) 366-5674

INDEFINITE QUANTITY CONTRACT, COMPUTER MODELING

DESCRIPTION: The purpose of this initiative is to provide technical support to NHTSA; e.g., development of computer simulation models and performance of related analyses. Project research will cover a wide range of subject areas including vehicle dynamics, driver performance, driver-vehicle interaction, and the effects of crash avoidance systems on safety, congestion, fuel usage and emissions.

START DATE: March, 1993

END DATE: To be determined.

STATUS: In contractual negotiation.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY92: N A

CONTRACTOR: To be determined.

CONTACT: Lloyd Emery, NHTSA Headquarters, NRD-51, (202) 366-5673

INDEFINITE QUANTITY CONTRACT, FIELD DATA COLLECTION AND ANALYSIS

DESCRIPTION: The purpose of this initiative is to provide technical support to NHTSA; e.g., performance of studies (e.g., expanded police accident investigations) to relate specific vehicle characteristics and/or driver behaviors, errors, and actions to crashes; and assessments of the potential applicability of specific countermeasures to crashes. This effort would be carried out with the cooperation of states or jurisdictions within states.

START DATE: September, 1992

END DATE: September, 1997

STATUS: Recently awarded.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: Dynamic Sciences

CONTACT: Michael Goodman, NHTSA Headquarters, NRD-52, (202) 366-5677

INDEFINITE QUANTITY CONTRACT, HUMAN FACTORS

DESCRIPTION: The purpose of this initiative is to provide technical support to NHTSA; e.g., research on driver-vehicle interaction, i.e., how the driving population processes information from the vehicle and roadway environment and responds in terms of vehicle control actions to avoid collisions. Vehicle subsystems of interest include lighting/signaling, direct and indirect visibility systems (e.g., glazing, mirrors), displays and controls, and collision warning systems.

START DATE: September, 1992

END DATE: September, 1997

STATUS: Recently awarded.

ESTIMATED COST: Not available

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: Battelle

CONTACT: Mike Perel, NHTSA Headquarters, NRD-52, (202) 366-5675

INDEFINITE QUANTITY CONTRACT, SENSOR TECHNOLOGY

DESCRIPTION: The purpose of this initiative is to provide technical support to NHTSA; e.g., systems analyses, technology reviews, feasibility studies, testing, simulation, and system safety studies in support of the development of sophisticated crash avoidance sensor systems to monitor driver status, vehicle status, environmental/roadway conditions, and vehicle movements. The development of silicon technologies has advanced sensor technology to the point where important and dramatic applications to motor vehicle crash avoidance are feasible.

START DATE: March, 1993

END DATE: To be determined.

STATUS: In contractual negotiation.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Jack Ference, NHTSA Headquarters, NRD-5 1, (202) 366-0168

PERFORMANCE SPECIFICATIONS: COUNTERMEASURES AGAINST INTERSECTION COLLISIONS

DESCRIPTION: This project will lead to the development of performance requirements (both hardware and human factors) for advanced technologies to improve crash avoidance of vehicles negotiating intersections. This project will address autonomous vehicle-based systems, vehicle-vehicle communication systems, and/or cooperative highway-vehicle systems requiring instrumentation of intersections.

START DATE: July, 1993

END DATE: To be determined.

STATUS: In pre-contractual stage.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Paul Spencer, NHTSA Headquarters, NRD-52, (202) 366-5668

**PERFORMANCE SPECIFICATIONS:
COUNTERMEASURES AGAINST LANE CHANGE, MERGING, AND
BACKING COLLISIONS**

DESCRIPTION: This project will lead to the development of performance requirements (both hardware and human factors) for advanced technologies to improve crash avoidance during lane change, merging and backing maneuvers. This project is conceived for countermeasure systems that will be self-contained within the vehicle. However, it does not exclude from consideration those countermeasure systems that may require, or that might be improved by, auxiliary equipment installed in the road or in other vehicles.

START DATE: March, 1993

END DATE: To be determined.

STATUS: In contractual negotiation stage.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Jose Bascunana, NHTSA Headquarters, NRD-5 1, (202) 366-5674

PERFORMANCE SPECIFICATIONS: COUNTERMEASURES AGAINST REAR-END COLLISIONS

DESCRIPTION: This project will lead to the development of performance requirements (both hardware and human factors) for advanced technologies to prevent and decrease the severity of rear-end crashes. This project is conceived for countermeasure systems which will be self-contained within the vehicle. However, it does not exclude consideration of countermeasure systems which require, or which would be improved by, auxiliary equipment installed in the road or in other vehicles.

START DATE: March, 1993

END DATE: To be determined.

STATUS: In negotiation stage.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Art Carter, NHTSA Headquarters, NRD-5 1, (202) 366-5669

**PERFORMANCE SPECIFICATIONS:
COUNTERMEASURES AGAINST
ROADWAY DEPARTURE COLLISIONS**

DESCRIPTION: This project will lead to the development of performance requirements (both hardware and human factors) for advanced technologies to improve crash avoidance during roadway departures, ("ran-off-road"). This project will address autonomous vehicle-based countermeasure systems and/or cooperative highway-vehicle systems requiring instrumentation of the roadway environment.

START DATE: September, 1993

END DATE: To be determined.

STATUS: In pre-contractual stage.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Lloyd Emery, NHTSA Headquarters, NRD-5 1, (202) 366-5673

PERFORMANCE SPECIFICATIONS: VISION ENHANCEMENT SYSTEMS FOR NIGHTTIME AND INCLEMENT WEATHER

DESCRIPTION: This project will investigate the feasibility of equipping motor vehicles with vision enhancement systems to assist driver visibility during nighttime and inclement weather, and thus prevent related crashes. It will consider the effectiveness, reliability, costs, practicability, and potential hazards introduced by such systems, and determine the performance required of one or more feasible night vision enhancement (NVE) systems, defining specifications in performance terms without constraining the systems to particular devices or technologies.

START DATE: June, 1993

END DATE: To be determined.

STATUS: In preliminary planning stage.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: August Burgett, NHTSA Headquarters, NRD-51, (202) 366-5672

PROBLEM DEFINITION AND ANALYSIS OF TARGET CRASHES AND IWISICOUNTERMEASURE ACTION

DESCRIPTION: This project will lead to the development and application of an analytical methodology for defining, analyzing, and modeling target crashes and IVHS/crash avoidance countermeasure action for the purpose of assessing potential effectiveness and identifying R&D needs. These findings will help the agency to prioritize and guide research and development on these countermeasures.

START DATE: August, 199 1

END DATE: On-going

STATUS: Draft reports for initial problem areas completed.

ESTIMATED TOTAL PROJECT COST:' \$1,280,000

ANTICIPATED TOTAL FEDERAL SHARE: \$1,280,000

FEDERAL FUNDS THROUGH FY 92: \$1,280,000

CONTRACTOR: Interagency Agreement with Volpe National Transportation Systems Center. Contractors: Battelle, Calspan, Castle Rock.

CONTACT: Ron Knipling, NHTSA Headquarters, NRD-53, (202) 366-4733

MILESTONE: AUTOMATED HIGHWAY SYSTEM (AHS)

OBJECTIVE: Demonstrate the first fully automated highway system prototype.

The 1997 demonstration requested by Congress is the AHS program's first major milestone, and will provide proof of concept feasibility for the AHS. Preparation for the demonstration will include the identification and evaluation of feasible alternative conceptual approaches.

The demonstration may feature one or more feasible concepts. Subsystems and control situations will be demonstrated including lateral and longitudinal control, transition between manual and automated control, maintenance of position in the roadway traffic flow, lane changing, and various malfunction management capabilities.

The demonstration results will lead to selection of the AHS conceptual approach, documentation of that approach in performance specifications and standards, and establishment of a partnership with industry to design, develop, and operationally test an AHS with public participation.

Underpinning the development of the first AHS demonstration is an understanding of the human factors issues related to AHS driver operations. The Department has recently begun a research project to develop comprehensive driver performance guidelines for AHS. The research focuses on AHS functional requirements and will include a comparable systems analysis, empirical human factors research, and an analysis of driver decisions and information required to fulfill driving functions. Safety issues associated with AHS including attentiveness, distractibility, and workload will be addressed. These issues will be examined through empirical research conducted in an interactive driving simulator and other laboratory facilities, and the results will be used to develop a human factors handbook for AHS designers.

AUTOMATED HIGH-WAY SYSTEM (AHS)

DESCRIPTION: In response to the Congressional mandate in the 1991 Intermodal Surface Transportation Efficiency Act to demonstrate an Automated Highway System (AHS) prototype on a test track by 1997, the Department of Transportation (DOT) has developed an aggressive long term program whose goal is the generation of a performance specification of an AHS. This performance specification is expected to be used by automotive product developers and transportation agencies to operationally deploy AHS's early in the twenty first century. The 1997 demonstration will serve as a major milestone in this overall program and will provide proof-of-concept feasibility of an AHS. AHS development will be performed by one or more consortia consisting of key stakeholders such as automotive manufacturers and transportation agencies, in partnership with FHWA.

START DATE: 1993

END DATE: 1997

STATUS: As part of the initial Analysis Phase of the AHS development program, the Federal Highway Administration has issued a broad agency announcement for performance of precursor system analyses relating to AHS. Multiple parallel analyses are desired to provide DOT and others in the IVHS community with a realistic range of MS configurations and a better understanding of the issues dealing with AHS applications, technology, design, deployment, operation, and practicality. The results of these analyses will support and facilitate subsequent system development activities. In parallel, efforts are ongoing to finalize the DOT acquisition strategy for the establishment of a consortium or consortia to perform system development work leading to the 1997 demonstration, with plans to issue a competitive solicitation for this purpose in early 1993.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTORS: To be determined.

CONTACT: J. Richard Bishop, FHWA R&D, HSR-10, (703) 2852680

HUMAN FACTORS DESIGN OF AUTOMATED HIGHWAY SYSTEMS

DESCRIPTION: Guidance on human factors issues is of critical importance to Automated Highway Systems (AHS) planners and designers. This research effort will provide timely human factors input during the conceptual stages of AHS development to aid in the design and implementation of the 1997 demonstration as well as to provide the foundation for the future advancement of AHS objectives.

This project includes both analytic and empirical tasks. In the early portion of the project, first generation AHS scenarios, including descriptions of AHS operations, objectives, and performance requirements, will be developed. These scenarios will be used as the basis for analytic and empirical research investigations addressing broad AHS human factors issues. In an iterative process, data from these efforts will be used to refine and revise the scenarios. The refined scenarios form the basis for a second set of empirical research investigations, addressing more detailed, system-specific AHS human factors issues. The culmination of these efforts will be an AHS Human Factors Handbook for AHS Designers and Driver-based AHS Human Factors System and Development Guidelines.

START DATE: October, 1992

END DATE: March, 1996

STATUS: Development of first generation AHS scenarios is underway.

**ESTIMATED TOTAL
PROJECT COST:** \$5086,582

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$5,086,582

**FEDERAL FUNDS
THROUGH FY 92:** \$5,086,582

CONTRACTOR: Honeywell, Inc.

CONTACT: Elizabeth Alicandri, FHWA R&D, HSR-10, (703) 285-2415

PATH

DESCRIPTION: The Partners for Advanced Transit and Highways (PATH) Program was established in 1986 by Caltrans and the Institute of Transportation Studies (ITS) of the University of California at Berkeley. The PATH research is conducted across a large range of subject areas, including ATMS, ATIS, AVCS, APTS, CVO, clean propulsion technology, human factors and safety system engineering, policy and planning, electronic toll collection, enabling technologies, and impacts/application studies. PATH differs from other IVHS programs in the considerable emphasis placed on clean propulsion technology and complete highway automation (AVCS III). Federal sponsorship of PATH research, begun in 1990, has focused primarily on AVCS activities.

START DATE: September, 1992 (for current phase of research)

END DATE: September, 1994

STATUS: In cooperation with CalTrans, FHWA is sponsoring research in fully automated highway systems, with emphasis on autonomous lateral and longitudinal vehicle control. Current activities are focused on the development of technology to support high-speed platooning, where packs of vehicles follow each other closely, using electronic sensing and communications, to increase highway capacity and safety. These efforts are focused upon advancing the state of knowledge of the performance that is achievable in vehicle-follower longitudinal control. These efforts include characterization of the performance of vehicle-to-vehicle sensors, vehicle-to-vehicle communications systems, and braking actuation systems, as well as extensive on-road testing.

ESTIMATED TOTAL PROJECT COST: \$2,550,000 (for current phase of research)

ANTICIPATED TOTAL FEDERAL SHARE: \$1,275,000 (for current phase of research)

FEDERAL FUNDS THROUGH F-Y 92: \$1,775,000

CONTRACTOR: California Department of Transportation (Caltrans), University of California at Berkeley

CONTACTS: J. Richard Bishop, FHWA R&D, HSR-10, (703) 285-2680

SAFETY ASSESSMENT OF THE PROTOTYPE AUTOMATED VEHICLE-HIGHWAY SYSTEM

DESCRIPTION: Provide safety-related assessments and support of the ISTEA-established prototype automated vehicle-highway system from conceptual development through operational test.

START DATE: To be determined.

END DATE: To be determined.

STATUS: Plans for initiation of the AVHS program are currently being formulated.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: August Burgett, NHTSA Headquarters, NRD-5 1, (202) 366-5672

STUDIES OF INFRASTRUCTURE AND TRAFFIC IMPACTS OF AVCS SYSTEM CONCEPTS

DESCRIPTION: Advanced vehicle control systems performing such functions as run-off-the-road warning/avoidance, night vision enhancement, and intersection collision warning/avoidance are being studied by NHTSA/Office of Crash Avoidance Research. In addition to contracts directed at detection systems to reduce specific types of accidents, NHTSA has awarded several contracts in areas such as sensors, electronics/communications, and human factors to perform analysis and testing of enabling technologies for AVCS. This significant NHTSA effort is expected to raise numerous issues concerning infrastructure interactions with AVCS. In many cases, system concept feasibility will hinge upon the infrastructure element, such as in the case of "cooperative" roadside hardware markings. This study effort will address these issues, in close coordination with NHTSA.

A related area of emphasis of this effort will be to examine the traffic flow impacts of non-AHS advanced vehicle control systems. Systems will be conceptualized and existing concepts derived from the NHTSA research will be evaluated on this basis.

STATUS: A Request for Proposals is scheduled to be issued in June 1993.

**ESTIMATED TOTAL
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL SHARE:** N A

**FEDERALFUNDS
THROUGH FY 92:** NA

CONTRACTOR: To be determined.

CONTACT: J. Richard Bishop, FHWA R&D, HSR-10, (703) 285-2680

ROADWAY POWERED ELECTRIC VEHICLE (RPEV)

- LOCATION:** Richmond Station and Playa Vista, California
- PARTNERS:** FHWA, Caltrans, LADOT, Los Angeles County Transportation Commission (LACTC), New York State Thruway, Georgia DOT, Georgia Tech Research Institute, Ross Industries Inc., Raytheon, GE, Arco Power Technology, Arthur D. Little, Inc.
- START DATE:** September, 1992
- END DATE:** February, 1994
- DESCRIPTION:** The RPEV provides for transmittal of electrical energy via an air path from devices in the roadway to electric vehicles. This was successfully accomplished via an inductive power transfer from a cable installed longitudinally in the pavement at Richmond Station in California.
- Phase II, at Playa Vista, will encompass advanced roadway development, five test vehicles, environmental studies, a second stage test facility, power supply and distribution system development, and economic feasibility and evaluation studies. Consideration is being given to the use of microwave technology for the power transfer in lieu of the inductive coupling used at Richmond Station.
- Phase III (1994-1995), will prototype the roadway design intended for the permanent road system at Playa Vista, and then build enough powered roadway network on the site to demonstrate an internal distribution system. It will include additional test vehicles and an advanced power supply capable of powering a typical highway segment, a production version of which **will** be used in the system at Playa Vista. It will continue the development and commercialization of automobile sized vehicles.
- STATUS:** Under design
- ESTIMATED TOTAL PROJECT COST:** \$7,650,000 (Phase II)
- ANTICIPATED TOTAL FEDERAL SHARE:** \$1,500,000 (Phase II)
- FEDERAL FUNDS THROUGH FY 92:** \$1,500,000 (Phase II)
- CONTACT:** H. Milton Heywood, FHWA Headquarters, HTV-10, (202) 366-2182

MILESTONE: BENEFITS AND COSTS

OBJECTIVE: Prepare estimates of the benefits and costs of various IVHS user services that have a sound analytic basis.

Preliminary work to predict the expected benefits and costs of various IVHS user services has been accomplished. More definitive work will be done during this period using information from a number of different sources, including the operational tests and newly developed modeling tools.

The primary source for direct measurement of the impacts and benefits of IVHS user services will be the evaluations of operational tests. Evaluation requirements will affect the design of these projects, as will the need to develop and incorporate data collection systems for capture of necessary information regarding travel behavior and other impacts such as energy and environmental effects. An evaluation plan appropriate to the scope and extent of the operational test will be a part of each project.

The DOT has already initiated efforts to develop detailed guidelines for the evaluation phases of operational tests. Sample evaluation plans are being developed which illustrate the use of appropriate measures of effectiveness and evaluation data which must be collected. More detailed guidelines will be developed to help assure that national uniformity is maintained.

Modeling and simulation tools are also being developed which will be able to predict systemwide impacts of IVHS before large scale operational tests are ready or need to be conducted. As these tools are developed, refined, and validated using the data collected from early operational tests, studies will be undertaken to examine the potential benefits of various IVHS user services, especially for benefit areas difficult to measure directly, such as systemwide mobility measures, fuel consumption, and emissions. A number of such studies will be defined and completed for a number of combinations of IVHS user services and benefit areas, and comparisons made to expected costs of the user services, including life cycle considerations.

AN IVHS BENEFITS ASSESSMENT FRAMEWORK

DESCRIPTION: This project is developing an analytical framework for assessing the benefits achievable from the deployment of IVHS technologies and strategies. The framework utilizes existing computer models for estimating potential changes in congestion, vehicle emissions, energy consumption, safety and other values. Although the framework is intended to encompass most IVHS technologies, this project primarily is concentrated on Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), and interacting Advanced Public Transit Systems (APTS). Planning models are used to assess both short- and long-term impacts of proposed IVHS deployments.

The product of this effort will be a set of interrelated models for estimating the impacts of specific IVHS deployment proposals. Network and corridor case studies will be produced using existing operational tests and corridor projects for which data exists.

START DATE: April, 1992

END DATE: October, 1993

STATUS: The following major reports have been produced:

- "Inventory of planning, traffic flow and emissions/fuel models",
- "Evaluation of models for benefits assessment", and
- "IVHS Benefits Assessment Framework -- Conceptual Approach to Model Enhancement".

Specific framework goals and the selection of planning, traffic, emissions, and energy models will be completed by January 30, 1993. Procedures for estimating safety effects of deployment will be completed by April 1993. Validation, case studies and the project final report are scheduled for completion by October 1993.

ESTIMATED TOTAL PROJECT COST: \$1,600,000

ANTICIPATED TOTAL FEDERAL SHARE: \$1,600,000

FEDERAL FUNDS THROUGH FY 92: \$700,000

CONTRACTOR: Volpe National Transportation Systems Center

CONTACT: Burton W. Stephens, FHWA Headquarters, HTV-32, (202) 366-2215

EVALUATION SUPPORT FOR OPERATIONAL TESTS

DESCRIPTION: This effort will focus on providing the necessary staffing and expertise to assist the development of evaluation plans and provide technical assistance in the monitoring of the evaluations for IVHS operational tests nationwide. This effort will develop a set of standard evaluation procedures and criteria for IVHS. This will form a common basis for comparison of similar projects, interpretation of testing/demonstration project results, and build upon the work conducted by the MITRE Corporation, the Oak Ridge National Laboratory, and the VOLPE Transportation Systems Center.

START DATE: To be determined.

END DATE: To be determined.

STATUS: An RFP is scheduled to be issued in March 1993.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Michael Freitas, FHWA R&D, HSR-10, (703) 285-2421

GUIDELINES FOR IVHS OPERATIONAL TEST EVALUATION PLANS: ATIS AND ATMS

DESCRIPTION: This document will provide guidelines for evaluation IVHS ATIS/ATMS operational tests. The guidelines call for a five phase process: operational test definition, evaluation definition, evaluation plan design, evaluation plan performance, and reporting. Project participants are assigned specific responsibilities. Formats for evaluation test plans and sample evaluation objectives are also included. This document will become the basis for similar guidelines for evaluating Commercial Vehicle Operations (CVO) Operational Tests.

START DATE: April, 1991

END DATE: January, 1993

STATUS: Document published as MITRE Working Paper, WP92W230, dated November 1992.

**ESTIMATED TOTAL
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL SHARE:** N A

**FEDERAL FUNDS
THROUGH FY 92:** NA

CONTRACTOR: The MITRE! Corporation

CONTACT: Michael Freitas, FHWA R&D, HSR-10, (703) 285-2421

**LABORATORY ASSESSMENT
OF THE POTENTIAL TRAFFIC OPERATION BENEFIT OF
IN-VEHICLE NAVIGATION SYSTEMS**

DESCRIPTION: Laboratory assessment techniques will be used to test the effectiveness of four types of in-vehicle navigation systems. These systems differ in type and amount of information made available to motorists on traffic operations and are applicable to recurrent and non-recurrent urban traffic congestion.

START DATE: September, 1987

END DATE: September, 199 1

STATUS: The contract has been completed and all reports have been delivered. Through a task order with the Oak Ridge National Laboratory, we are expanding the work by restricting the diversion rates when the off-ramps become congested. The draft of the report on the Oak Ridge activity has been received.

ESTIMATED TOTAL PROJECT COST: \$503,000

ANTICIPATED TOTAL FEDERAL SHARE: \$503,000

FEDERAL FUNDS THROUGH FY 92: \$503,000

CONTRACTOR: JFT Associates

CONTACTS: Stephen L. Cohen, FHWA R&D, HSR-10, (703) 285-2091

SAFETY EVALUATIONS OF DOT IVHS OPERATIONAL TESTS

DESCRIPTION: Develop and apply evaluation protocols to assess the safety impact of IVHS technologies being evaluated in DOT operational tests. The systems being tested are designed primarily to increase the efficiency of traffic flow; e.g., route guidance systems, traveller information systems, etc.

START DATE: May, 1991

END DATE: On-going

STATUS: Evaluation of TravTek (Orlando, Florida) route guidance and navigation systems is underway. Planning and implementation are underway for TRAVEL AID (Seattle, Washington) hazard warning systems and ADVANCE (Chicago) and FAST-TRAC (Oakland County, Michigan) route guidance and navigation systems.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: various

CONTACT: August Burgett, NHTSA Headquarters, NRD-5 1, (202) 366-5672

MILESTONE: INSTITUTIONAL AND LEGAL ISSUES

OBJECTIVE: Recommend and implement administrative, policy, and legislative actions that have strong probability of expediting full-scale deployment of a national, comprehensive IVHS program.

The Department of Transportation has implemented an Institutional and Legal Issues program to address the non-technical concerns confronting IVHS deployment. There are five major research categories for the program: public/private cooperation, deployment, intergovernmental cooperation, legal issues, and environmental issues. In addition, the completion of the Nontechnical Constraints Report due to Congress in 1993 and three years thereafter is also being developed under the rubric of the Institutional and Legal Issues Program.

The Department will primarily use a “lessons learned” approach when examining IVHS public/private cooperation. Selected operational tests will be tracked to examine various non-technical issues: organizational structures, legal arrangements, jurisdictional concerns, insurance or immunity arrangements, etc. “Lessons learned” from these operational tests could then be used by other areas when structuring their projects. The Department will also examine other technologies, particularly those associated with the communications industry, to determine lessons that could be applied to a growing IVHS industry. This research will lead to the development of model franchise arrangements illustrating the private sector’s provision of certain IVHS services. Beginning in Fiscal Year 1994, the Department will use research developed to this point and begin additional research to evaluate the implications of alternative public and private sector roles in the provision of various IVHS services.

Those projects specifically categorized under deployment are: evaluation of public acceptance of IVHS technologies and services, evaluation of educational and staffing skills required for successful deployment and operation of IVHS technologies, and development of a local consensus for IVHS deployment.

The program will address intergovernmental cooperation through such mechanisms as integrating IVHS into the metropolitan planning process.

Legal issues that will be addressed over the next five years include: evaluating the impact of tort liability upon the implementation of IVHS technologies and finding methods to manage liability risks, developing alternative procurement models for

use by Federal, State, and local governments and the private sector, analyzing Federal and State privacy laws and their impact on various IVHS technologies, and surveying State sovereign and contractor immunity laws to evaluate their applicability to IVHS liability risks.

Finally, the Department will assess the potential environmental impacts of IVHS deployment and monitor such impacts during early deployment stages. Air quality is an important consideration in the development of urban-oriented advanced traffic management and traveler information systems. Real-time monitoring of emissions at existing and potential “hot spots” such as freeway ramps and urban intersections is expected to be employed in the **development and implementation of some traffic signal control strategies.**

I-95 CORRIDOR COALITION

DESCRIPTION: This organization is a voluntary association that joins 12 State DOTs in the Northeast (from Maine to Virginia, including the District of Columbia) with 11 independent transportation and toll authorities and 3 cooperating Federal agencies. The Coalition will focus on implementing effective communications and coordinated operations where needed to achieve efficiencies in serving the travel needs of public and commercial users along the corridor. A business plan for the Coalition will be developed, and widespread use of intelligent vehicle-highway systems (IVHS) technologies that can assist electronic toll collection, traffic and transit fleet management, traveler information collection and dissemination, and incident management will be considered.

START DATE: 1992

END DATE: On-going

STATUS: An organizational structure consisting of an Executive Board, Steering Committee, and several functional working groups (Highway Operations, Technology/Functional Requirements, Privatization, and Institutional Needs) has been formed. A consultant contract for support of Coalition activities is expected to be finalized in January 1993 with a joint venture of Parsons Brinkerhoff-Farradyne- JHX and Associates. Initial activities include administrative support and development of a five-year Business Plan for the Coalition.

ESTIMATED TOTAL PROJECT COST: \$515,000 (first year of consultant contract)

ANTICIPATED TOTAL FEDERAL SHARE: \$515,000

FEDERAL FUNDS THROUGH FY 92: 0

CONTRACTOR: Delaware Department of Transportation (administrative lead)

CONTACT: Michael Halladay, FHWA Headquarters, HTV-20, (202) 366-6503

IVHS EDUCATIONAL AND STAFFING NEEDS

- DESCRIPTION: The objectives of this study are to:
- (1) assess current beliefs as to IVHS educational and staffing needs for both the short- and long- terms;
 - (2) assess the current job market to determine the availability of the technical and program (program management, legal, and policy) skills to adequately address these needs;
 - (3) use economic, policy, and educational statistical material to project future trends in the technical and program management job market applicable to IVHS and
 - (4) provide recommendations on strategies for public agencies, the private sector, and academic institutions to ensure that the necessary technical and program skills will be available in the U.S. job market.

The end product of this contract is a comprehensive report on IVHS educational and staffing needs, including recommended strategies for the public, private, and academic sectors to ensure these needs are met.

START DATE: September, 1992

END DATE: August, 1993

STATUS: The contractor has completed a work plan, including a schedule and a tentative list of interviewees for focus groups and individual discussions on IVHS educational and staffing needs.

ESTIMATED TOTAL
PROJECT COST: \$144,449

ANTICIPATED TOTAL
FEDERAL SHARE: \$144,449

FEDERAL FUNDS
THROUGH FY 92: \$144,449

CONTRACTOR: The Urban Institute

CONTACT: Beverly Russell, FHWA Headquarters, HTV-10, (202) 366-2202

IVHS ENVIRONMENTAL ISSUES

DESCRIPTION: Studies will be implemented to examine the deployment of IVHS technologies and their potential impact on emissions. The first phase will include development of an analytical framework for assessment of travel behavior and air quality impacts of various IVHS strategies.

START DATE: November, 1992

END DATE: On-going

STATUS: An initial white paper is currently being prepared through the Volpe National Transportation Systems Center. The white paper will identify a range of representative IVHS actions, and develop preliminary, qualitative assessments of their individual effects on travel behavior, vehicle emissions of different pollutants, and urban air quality. The paper will be published by summer 1993.

**ESTIMATED TOTAL
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL SHARE:** NA

**FEDERAL FUNDS
THROUGH FY 92:** 0

CONTRACTOR: Volpe National Transportation Systems Center (others to be determined)

CONTACT: Joon-Ho Byun, FHWA Headquarters, HEP-41, (202) 366-2204

IVHS INSTITUTIONAL ISSUES: GEORGE MASON UNIVERSITY

DESCRIPTION: George Mason University's Institute of Public Policy will study critical mass transportation issues associated with the implementation of IVHS in the Northern Virginia specifically and the United States more generally. It will identify areas in Northern Virginia where IVHS applications may be applied; conduct analytical policy studies; and develop educational outreach services for transportation policy and decisionmakers.

START DATE: March, 1992

END DATE: February, 1994

STATUS: An IVHS Conference was held December 8 in Alexandria, Virginia. The university met with the Northern Virginia Transportation Commission, Washington Council of Governments, WMATA, and other transit operators in the region to explore merging route-and-fare databases to transit users. Smart kiosks are being investigated and demonstrated.

ESTIMATED TOTAL PROJECT COST: \$750,000

ANTICIPATED TOTAL FEDERAL SHARE: \$750,000

FEDERALFWNDS THROUGH FY 92: \$383,968

CONTRACTOR: George Mason University

CONTACTS: Ronald Fisher, FTA Headquarters, (202) 366-4995

LESSONS FROM OTHER TECHNOLOGIES: OVERCOMING BARRIERS TO IVHS DEPLOYMENT

DESCRIPTION: The product of this research will be a report that compares the institutional issues surrounding deployment of IVHS with issues surrounding deployment of telecommunications and other advanced technologies. This research will also examine various issues related to franchising private sector provision of certain IVHS services.

START DATE: To be determined.

END DATE: To be determined.

STATUS: This project has recently been awarded to the Urban Institute.

ESTIMATED TOTAL PROJECT COST: \$500,000

ANTICIPATED TOTAL FEDERAL SHARE: \$500,000

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: The Urban Institute

CONTACT: James Saklas, FHWA Headquarters, HPP-12, (202) 366-9254

METROPOLITAN TRAFFIC MANAGE-MEW

DESCRIPTION: The objective of this study is to determine whether there are specific impediments to greater coordination among regional and metropolitan traffic management operations. Responsibility for traffic management operations has evolved over time in response to differing requirements, resource availability and institutional and political arrangements. In metropolitan areas, such responsibilities are usually found dispersed among distinct political jurisdictions and within jurisdictions there are likely to be a number of separate agencies involved in various aspects of traffic management operations. The various IVHS technologies have been proposed as potentially of great value in enhancing the efficiency of metropolitan traffic management services and other services made feasible by the new technologies.

There are three main parts to this study: (1) a review of the relevant literature in traffic management, public administration, organization theory, and economics related to metropolitan cooperation; (2) a review of the current state of coordination and cooperation in metropolitan traffic management practices; and (3) recommendations for facilitating closer coordination (where it is needed), including federal standards, model legislation, funding mechanism changes, etc.

START DATE: October, 1992

END DATE: June, 1993

STATUS: The Volpe Transportation Systems Center is managing this research. The work is being undertaken by Booz-Allen & Hamilton. The report is due June 1, 1993.

**ESTIMATED TOTAL
PROJECT COST:** \$200,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$200,000

**FEDERAL FUNDS
THROUGH FY 92:** \$200,000

CONTRACTOR: Volpe National Transportation Systems Center

CONTACT: Thomas Marchessault, Office of the Secretary of Transportation, P-37
(202) 366-5412

OPERATIONAL TEST CASE STUDIES

DESCRIPTION: A “case study” approach will be used to track and examine various non-technical issues in developing U.S. IVHS operational tests. This project consists of external evaluations by a contractor not associated with operational test projects.

START DATE: May, 1992

END DATE: To be determined.

STATUS: The Volpe National Transportation Systems Center has tentatively identified those institutional issues that will be used as part of the evaluation.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: \$750,000

CONTRACTOR: Volpe National Transportation Systems Center

CONTACTS: James March, FHWA Headquarters, HPP-12, (202) 366-9237

PUBLIC ACCEPTANCE OF IVHS TECHNOLOGIES AND SERVICES

DESCRIPTION: This project will include analysis of public acceptance and potential markets for IVHS services and users' willingness-to-pay for various bundles of products and services.

START DATE: October, 1992

END DATE: September, 1994

STATUS: The Volpe Center is currently examining different means of evaluating public acceptance and users' willingness-to-pay, including laboratory assessments of users' responses to different IVHS technologies such as traveler information systems and route guidance systems. The potential for collecting information on the public acceptance of IVHS and the willingness to pay for IVHS products and services from operational tests also is being examined.

**ESTIMATED TOTAL
PROJECT COST:** \$500,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$500,000

**FEDERAL FUNDS
THROUGH FY 92:** \$500,000

CONTRACTOR: Volpe National Transportation Systems Center

CONTACTS: James March, FHWA Headquarters, HPP- 12, (202) 366-9237

**REFERENCE ON
INTERNAL INSTITUTIONAL, EVALUATION
OF OPERATIONAL TESTS**

DESCRIPTION: The reference will be part of the overall preliminary evaluation guidelines being developed by the MITRE Corporation for operational tests managers or their designated contractors. The guidelines will cover both nontechnical and technical evaluations.

START DATE: June, 1992

END DATE: March, 1993

STATUS: MITRE has completed preliminary identification of institutional issues and evaluation techniques.

ESTIMATED TOTAL PROJECT COST: \$150,000

ANTICIPATED TOTAL FEDERAL SHARE: \$150,000

FEDERAL FUNDS THROUGH FY 92: \$150,000

CONTRACTOR: The MITRE Corporation

CONTACT: Michael Freitas, FHWA R&D, HSR-10, (703) 285-2421

ANALYSIS OF FEDERAL AND STATE PRIVACY LAWS AND DEVELOPMENT OF A STATEMENT OF PRINCIPLES

DESCRIPTION: This effort will survey Federal and state privacy laws to determine which uses of information gathered through existing and proposed IVHS technologies are allowed under current law and which uses will be affected by pending legislation. It will recommend legal safeguards to ensure compliance with existing privacy laws and propose a strategy for promoting beneficial uses of information collected by IVHS. **A statement of principles or code of conduct to safeguard privacy will be developed.** The statement will provide a basis for discussion and possible adoption by IVHS participants, both public and private.

START DATE: To be determined.

END DATE: To be determined.

STATUS: The Request for Proposals is tentatively scheduled to be issued by summer 1993.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACTS: Julie Dingle, FHWA Headquarters, HCC-32, (202) 366-1394

**EXPLORATION OF
ALTERNATIVE PROCUREMENT MODELS
FOR IVHS TECHNOLOGIES**

DESCRIPTION: This effort will investigate various federal, state, and local procurement rules applicable to IVHS development and deployment, identify the aspects of those rules that create unreasonable impediments to IVHS deployment through research and discussions with IVHS participants, suggest alternative models for procurement, and suggest methods of streamlining and improving current procurement processes.

START DATE: To be determined.

END DATE: To be determined.

STATUS: The Request for Proposals is tentatively scheduled to be issued by summer 1993.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACTS: Beverly Russell, FHWA Headquarters, HTV-10, (202) 366-2202

**EVALUATION OF THE
IMPACT OF POTENTIAL TORT LIABILITY
UPON IVHS TECHNOLOGIES
AND OF METHODS TO MANAGE LIABILITY RISKS**

DESCRIPTION: This effort will result in several white papers on liability issues. The Department of Justice paper (required for the Nontechnical Constraints Report mandated by the Intermodal Surface Transportation Efficiency Act of 1991) will be analyzed and additional topics would be developed to address liability issues not fully covered in the Justice report or topics on which differing viewpoints should be solicited. The papers will identify scenarios in which IVHS information technologies are perceived to pose liability risks and determine which of the perceived liability risks are serious. The work will include both legal research and discussions with manufacturers, government agencies, insurers, academics and products liability and automobile accident lawyers. Litigation and risk management techniques involving analogous technologies will also be analyzed. These papers as well as the Justice report will be presented at a conference.

START DATE: To be determined.

END DATE: To be determined.

STATUS: This project will be initiated by a general call for papers on various IVHS legal topics.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: N A

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACTS: Julie Dingle, FHWA Headquarters, HCC-32, (202) 366-1394

IDENTIFICATION OF LEGAL ISSUES

DESCRIPTION: The objective of this research is to conduct a review of public and private activities in the research, development, and deployment of IVHS in order to identify the legal constraints to those activities. The FHWA will implement more rigorous follow-up studies based on the recommendations in the report.

START DATE: July, 1992

END DATE: December, 1992

STATUS: The final report should be available by May 1993.

ESTIMATED TOTAL PROJECT COST: \$16,500

ANTICIPATED TOTAL FEDERAL SHARE: \$16,500

FEDERAL FUNDS THROUGH FY 92: \$16,500

CONTRACTOR: Professor Kent Syverud, University of Michigan

CONTACT: Julie Dingle, FHWA Headquarters, HCC-32, (202) 366-1394

**SURVEY OF STATE SOVEREIGN IMMUNITY AND
CONTRACTOR IMMUNITY AND THEIR
APPLICABILITY TO IVHS LIABILITY RISKS**

DESCRIPTION: This effort will survey literature on federal and state laws on immunity of governments and their contractors from tort liability. This research will include all relevant agencies and contractors and will not be limited to the liability of highway agencies and contractors. It will include research into liability for development and deployment of potentially hazardous technologies. This effort will identify and analyze any methods employed under state or federal law to extend, alter, or modify sovereign immunity to promote or alter the development or deployment of new technologies. It will also suggest potential sovereign immunity reforms to help assure desirable levels of investment in and deployment of IVHS technologies. The product of this effort will be a detailed reference work and a paper analyzing possible legislative reforms.

START DATE: To be determined.

END DATE: To be determined.

STATUS: This project will be initiated by a general call for papers on various IVHS legal topics.

**ESTIMATED TOTAL
PROJECT COST:** NA

**ANTICIPATED TOTAL
FEDERAL SHARE:** NA

**FEDERAL FUNDS
THROUGH FY 92:** NA

CONTRACTOR: To be determined.

CONTACT: Julie Dingle, FHWA Headquarters, HCC-32, (202) 366-1394

MILESTONE: IVHS DEPLOYMENT

OBJECTIVE: Complete development of a comprehensive IVHS Deployment Plan which identifies and provides coordination for the major strategies which must be addressed to ensure the deployment of a nationally compatible system.

The framework around which the Department's role in deployment will be formed is the IVHS Deployment Plan. The Plan is being developed by a Departmental multi-agency team, with input from our partners in the public and private sectors, academia, and IVHS AMERICA. Completion is expected in the spring of 1993.

The Deployment Plan will define a wide array of deployment activities. It will describe the major components necessary to support the successful deployment of IVHS: planning, coordination, education, and marketing. It will further specify these components in terms of the needs of a variety of clients, and the specific products which will be developed to address these needs.

By the end of 1997, a variety of material will be available in the four component areas to support deployment activities in areas across the country. We will continue to work toward the completion of IVHS deployment planning studies in all metropolitan areas with a population of 500,000 or more. In the coordination area, we will develop and encourage the use of processes for considering IVHS deployment in the development/updating of congestion, safety, transit management, and intermodal systems, and in statewide and metropolitan area planning activities. Successful examples of intergovernmental cooperation and public/private partnerships will be publicized. Training courses aimed at teaching public agency personnel about IVHS applications will be offered and information for use in graduate level college courses will be developed. As they become available, the results from other IVHS program activities will be summarized and widely distributed through different media to further guide local IVHS deployment activities. Technical information will be disseminated in the form of handbooks and guidelines.

The Deployment Plan will allow a great degree of flexibility so that activities can be identified that will remain responsive to client needs, and assure that the results of the Department's program activities receive wide distribution in the forms most likely to be useful to our clients.

BOSTON, MASSACHUSETTS AREAWIDE EARLY DEPLOYMENT STUDY

DESCRIPTION: The proposal calls for the development of a two-phased conceptual IVHS plan for the Boston Metropolitan Area for years 1994 and 2000. The proposal is presented in three parts.

Part I: Describe existing and projected congestion problems and assess current and emerging IVHS technologies for possible application in the region.

Part II: Define a two-horizon plan suitable for years 1994 and 2000. The 1994 plan is the short-range plan consisting of the latest state-of-practice technologies. The long-range plan for year 2000 is envisioned as including advanced and promising technologies.

Part III: Identify and recommend any organizational changes needed to manage the new technology and operational thrust of the IVHS program.

START DATE: December 24, 1992 (Notice to proceed given)

END DATE: September 9, 1993 (Scheduled)

STATUS: Notice to proceed has been given, and the project is now just underway.

ESTIMATED TOTAL PROJECT COST: \$450,000

ANTICIPATED TOTAL FEDERAL SHARE: \$360,000

FEDERAL FUNDS THROUGH FY 92: NA

CONTACT: Jonathan McDade, FHWA Reg. 1, New York, HPP-01, (518) 472-4253

CHARLESTON, SOUTH CAROLINA AREAWIDE EARLY DEPLOYMENT STUDY

DESCRPTION: These funds will be used to perform a traffic study and prepare specifications and plans for implementing new technologies to manage and reduce congestion in the Charleston, South Carolina Metropolitan Area. The project consists of five tasks.

Task 1. Identify routes and sources of potential traffic congestion.

Task 2. Identify and recommend traffic operations systems techniques which may be used to detect and monitor traffic conditions.

Task 3. Recommend traffic operations system and management techniques which may be utilized to mitigate the congestion.

Task 4. Recommend the method of monitoring, the physical facilities, the location of this control, and the equipment and staffing requirements.

Task 5. Prepare plans, specifications and estimates to procure and construct those devices, techniques, methods or processes.

START DATE: March, 1993

END DATE: March, 1994

STATUS: Consultant selection is complete.

**ESTIMATED TOTAL
PROJECT COST:** \$400,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$320,000

**FEDERAL FUNDS
THROUGH FY 92:** \$320,000

CONTACT: Patricia Harrison, FHWA Reg. 4, Georgia, HES-04, 404-347-4075

CHARLOTTE, NORTH CAROLINA AREA WIDE EARLY DEPLOYMENT STUDY

DESCRIPTION: The overall project will incorporate elements of Advanced Traffic Management Systems, Advanced Traveler Information Systems and Commercial Vehicle Operations for the greater Charlotte/Mecklenberg area. The phase I initiative consists of the development and operations of a freeway management system for a 15.2 mile section of I-77, including a traffic control center. The phase II initiative will extend the application of these technologies to the entire 147 mile freeway system that is planned for the Charlotte Urban Area. This project is for an areawide study of potential IVHS deployment activities in the Charlotte metropolitan area.

START DATE: June, 1992

END DATE: December, 1993

STATUS: The project study is on schedule and will be completed by the target date.

ESTIMATED TOTAL PROJECT COST: \$500,000

ANTICIPATED TOTAL FEDERAL SHARE: \$400,000

FEDERAL FUNDS THROUGH FY 92: \$400,000

CONTACT: Patricia Harrison, FHWA Reg. 4, Georgia, HES-04, 404-347-4075

DALLAS, TEXAS AREAWIDE EARLY DEPLOYMENT STUDY

DESCRIPTION: The purpose of the Dallas area-wide IVHS plan is to improve mobility, safety, and productivity. The goals of the plan are:

- Coordinate with public and private sectors to collect and disseminate real-time information on traffic and transit conditions.
- Optimize transportation system operations by coordinating operations among governmental agencies.
- Encourage transit and HOV usage.

These goals will be addressed through six objectives with specific tasks associated with each objective.

1. Establish a broadly-based Steering Committee with representatives from multiple agencies.
2. Assess the existing transportation management and communications linkages and investigate the potential application of IVHS technologies.
3. Identify institutional and legal barriers to coordination and recommend solutions.
4. Produce an integrated, area-wide multimodal, multi-jurisdictional IVHS plan while maintaining flexibility to incorporate emerging **technologies**.
5. Develop project evaluation criteria, costs and benefits, priorities, and staged implementation plan.
6. Define projects for implementation, prepare proposals, and identify private and public funding sources.

START DATE: October 1992

END DATE: December 1994

STATUS: The steering committee has been formed and the investigation of current IVHS technologies has begun.

**ESTIMATED TOTAL
PROJECT COST:** \$750,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$600,000

**FEDERAL FUNDS
THROUGH FY 92:** \$600,000

CONTACT: Greg Jones, FHWA Reg. 6, Texas, HEO-06, (817) 334-4379

DENVER, COLORADO AREAWIDE EARLY DEPLOYMENT STUDY

DESCRIPTION: This Early Deployment Project is developing an Intelligent Vehicle/Highway Strategic Plan for the Denver Metropolitan Area. The plan, covering the next 10 years, will select the first smart corridor and provide a guide for the implementation and deployment of IVHS technologies on this corridor, as well as throughout the metro area.

START DATE: December, 1991

END DATE: April, 1993

STATUS: A detailed IVHS technology review has been completed and a draft report prepared. A Preliminary Strategic Plan has been prepared. The draft Early Action Plan has been completed. The 1st draft of the Master Plan has been reviewed by the Task Force. The criteria for evaluation of the Traffic Operations Center and demonstration corridors is complete. Work on the draft final report is in progress.

ESTIMATED TOTAL PROJECT COST: \$316,328

ANTICIPATED TOTAL FEDERAL SHARE: \$213,000

FEDERAL FUNDS THROUGH FY 92: \$213,000

CONTACT: C.P. Damon, FHWA Reg. 8, HPP-08, (303) 969-6712

DENVER, COLORADO
PRELIMINARY ENGINEERING
EARLY DEPLOYMENT STUDY

DESCRIPTION: The Colorado DOT is developing an Intelligent Vehicle/Highway Strategic Plan for the Denver Metropolitan Area. The plan will provide a guideline for the implementation of IVHS technologies during the next 10 years. One of the first recommendations was to provide a Traffic Operations Center (TOC) as the focal point for multi-agency and public/private sector traffic management and IVHS activities. This project is to develop the final design (PS&E) package for the TOC and the field elements that are needed to support the TOC.

START DATE: September, 1992

END DATE: January, 1994

STATUS: There has been no progress on the TOC design at this time. The completion of the final reports from the Strategic Plan need to be completed before a great deal of work is done on the TOC. Site selection is underway and the design of the building to house the TOC is dependent upon this decision.

ESTIMATED TOTAL PROJECT COST: \$625,000

ANTICIPATED TOTAL FEDERAL SHARE: \$500,000

FEDERAL FUNDS THROUGH FY 92: NA

CONTACT: C.P. Damon, FHWA Reg. 8, HPP-08, (303) 969-6712

DETROIT, MICHIGAN AREAWIDE EARLY DEPLOYMENT STUDY

DESCRIPTION: The Michigan Department of Transportation proposes to retain the services of a consultant to assist with the preparation of a comprehensive deployment plan addressing the issues related to an upgrade and expansion of the existing 32.5 mile ATMS/ATIS (freeway surveillance) system in the Southeast Michigan - Metropolitan Detroit Area. The existing system was installed in 1980-81 and is a direct descendant of the John Lodge Freeway Surveillance project of the late 1960's. The state's existing five year action plan calls for extending ATMS/ATIS coverage over a system encompassing some 250 miles. Staging, costs and all technical aspects of this plan will be reexamined and refined in the context of evolving IVHS technologies. The study will review traffic data, determine the area's functional requirements for ATMS/ATIS services, identify and analyze alternative ATMS/ATIS technologies, and present a staged plan of recommended actions. The study will also develop a model approach to the development and deployment of alternative routings and traffic management plans for handling incidents.

START DATE: September 1992 (Project Cooperative Agreement Signed)

END DATE: 12-24 months following September 15,1992

STATUS: As of January 1993, State is in the process of soliciting consultant proposals through an RFP.

ESTIMATED TOTAL PROJECT COST: \$500,000

ANTICIPATED TOTAL FEDERAL SHARE: \$400,000

FEDERAL FUNDS THROUGH FY 92: \$400,000

CONTACTS: Martin Monahan, FHWA Reg. 5, Illinois, HEO-05, (708) 206-3218

GREENSBORO, NORTH CAROLINA CORRIDOR EARLY DEPLOYMENT STUDY

DESCRIPTION: This proposal is known as Incident Management Program for Active Control of Traffic, IMPACT. The project area encompasses the Greensboro, Winston-Salem, High Point area and focuses on the east-west interstate corridor, I-40/I-85, through Greensboro. The project will identify and evaluate the technologies applicable to a corridor ATMS system. Following selection of appropriate technologies, preliminary designs will be developed.

START DATE: June, 1992

END DATE: June, 1994

STATUS: The project is currently behind schedule but progress is improving.

ESTIMATED TOTAL PROJECT COST: \$187,000

ANTICIPATED TOTAL FEDERAL SHARE: \$187,000

FEDERAL FUNDS THROUGH FY 92: \$150,000

CONTACT: Patricia Harrison, FHWA Reg. 4, Georgia, HES-04, 404-347-4075

GREENVILLE, SOUTH CAROLINA AREA WIDE EARLY DEPLOYMENT STUDY

DESCRIPTION: The proposed congestion management plan includes: identifying and evaluating present and projected areas of congestion, preparing preliminary engineering designs and specifications for equipment and operational systems, preparing a preliminary design for the organization and operation of a tri-county central traffic management coordination center, outlining associated public education and information programs, and developing cost estimates and schedules for phased development of an ATMS.

Phase I will organize a congestion management group to oversee the work. Phase II includes developing an inventory of system components, selecting standards and strategies, creating conceptual designs, proposing ATMS technologies and evaluation alternatives. Phase III includes development of reports and conceptual designs.

START DATE: March, 1993

END DATE: December, 1994

STATUS: The project is in the request for proposals phase.

**ESTIMATED TOTAL
PROJECT COST:** \$250,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$200,000

**FEDERAL FUNDS
THROUGH FY 92:** \$200,000

CONTACT: Patricia Harrison, FHWA Reg. 4, Georgia, HES-04, 404-347-4075

HAMPTON ROADS, VIRGINIA AREAWIDE EARLY DEPLOYMENT STUDY

DESCRIPTION: The objective of this study is to retain a consultant specialized in IVHS and congestion management techniques, who will develop a comprehensive master plan, COMPARE, for implementation of IVHS strategies in the Hampton Roads Area. Elements of the plan will be developed for both short and long term implementation. Phase 1 consists of the development of a COMPARE concept plan, an inter-agency voice/data communication system, and a traveller traffic information system.

START DATE: June, 1993

END DATE: June, 1994

STATUS: An RFP is being developed.

ESTIMATED TOTAL PROJECT COST: \$375,000

ANTICIPATED TOTAL FEDERAL SHARE: \$300,000

FEDERAL FUNDS THROUGH FY 92: 0

CONTACTS: Bob Thomas or Don Holoway
FHWA, Virginia Division, HDA-VA, (804) 771-2371

I-70 DENVER, COLORADO CORRIDOR
EARLY DEPLOYMENT STUDY

DESCRIPTION: The Colorado DOT proposed to focus on the application of IVHS technology in the I-70 corridor west of Denver. The corridor is seen as having high potential for developing the rural application of IVHS technologies with heavy emphasis on ATMS and ATIS. This project will focus on developing a comprehensive implementation program of IVHS technologies aimed at a multi-phase effort which clearly identifies the most feasible options, gain public support, and enlists cooperation of private sector interests. The project has three phases. This effort includes phase one only. A consultant will identify and evaluate applicable IVHS technologies, identify early action items, prepare a corridor master plan, assist in educational efforts and prepare reports on the project.

START DATE: July, 1992

END DATE: May, 1994

STATUS: The Consultant selection process is underway and a consultant selection is expected by mid-March, 1993.

ESTIMATED TOTAL PROJECT COST: \$210,000

ANTICIPATED TOTAL FEDERAL SHARE: \$168,000

FEDERAL FUNDS THROUGH FY 92: NA

CONTACT: C.P. Damon, F'HWA Reg. 8, HPP-08, (303) 969-6712

LOS ANGELES/SAN DIEGO, CALIFORNIA CORRIDOR EARLY DEPLOYMENT STUDY

DESCRIPTION: This study will examine the current and proposed uses of IVHS technology in the San Diego - Los Angeles corridor. The study will be multimodal in nature and will include all major facilities and all categories of IVHS technology. The primary product of this study will be a master plan to coordinate the deployment of IVHS technology in the corridor and in the major metropolitan areas along the corridor (San Diego, Orange County, Los Angeles). An RFP for the study is currently being prepared.

START DATE: NA

END DATE: NA

STATUS: An RFP for the study is currently being prepared.

ESTIMATED TOTAL PROJECT COST: \$150,000

ANTICIPATED TOTAL FEDERAL SHARE: \$150,000

FEDERAL FUNDS THROUGH N 92: \$150,000

CONTACT: Jeff Lindley, FHWA Reg. 9, California, HPD-09, (415) 744-2659

LOUISVILLE, KENTUCKY AREAWIDE EARLY DEPLOYMENT STUDY

DESCRIPTION: This proposal intends to develop a regional ATMS plan for metropolitan Louisville, Kentucky. A consultant will perform the necessary studies for development of the early implementation plan. The tasks include:

1. Inventory the existing system and collect data including volumes, speeds, and delay.
2. Develop management strategies and alternative routing plans for incidents. Elements to be considered as part of the strategies are detection, communication systems, CCTV, CMS, HAR, and a centralized traffic control center. The end product will be the Traffic Management Plan, the recommended system modifications required to implement the plan and the estimated cost of implementing each recommended element.

START DATE: June, 1992

END DATE: June, 1994

STATUS: A consultant has been selected.

**ESTIMATED TOTAL
PROJECT COST:** \$312,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$250,000

**FEDERAL FUNDS
THROUGH FY 92:** \$250,000

CONTACT: Patricia Harrison, FHWA Reg. 4, Georgia, HES-04, 404-347-4075

PITTSBURGH, PENNSYLVANIA AREAWIDE EARLY DEPLOYMENT STUDY

DESCRIPTION: A Freeway Surveillance and Control System is proposed for the 25.1 miles of the Penn Lincoln Parkway from the Greater Pittsburgh International Airport to the Penn Turnpike. This project consists of incident detection via closed circuit TV cameras, loop detectors and CB monitors. Information on traffic conditions will be supplied to motorists by use of changeable message signs and a parkway advisory radio. Operation will be controlled through use of a limited ramp merge signal system in the most congested sections of the freeway. All these components will be connected into a traffic control center. Along with analyses of communications alternatives, operating strategies, etc., the study will identify three implementation alternatives based on projected availability of funds.

This system will be crucial in order for PennDOT to effectively manage traffic during the 1-year closing of the Fort Pitt Bridge and Tunnel in 1994 for reconstruction.

START DATE: November, 1992

END DATE: December, 1993

STATUS: The Department (PennDOT) has executed a consultant agreement with F.R. Harris.

**ESTIMATED TOTAL
PROJECT COST:** \$1,200,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$400,000

**FEDERAL FUNDS
THROUGH FY 92:** \$400,000

CONTACT: Jose Ramirez, FHWA, Pennsylvania Div., HDV-PA, (717) 782-3940

PORTLAND, OREGON AREAWIDE EARLY DEPLOYMENT STUDY

DESCRIPTION: The consultant is nearly complete with the data collection phase of the project. Three draft source books have been prepared, including 1) "Signal Systems and Detections", 2) "Corridor Assessments", and 3) "Incident Management - Background Paper". The Signal Systems and Detection source book summarizes the results of a survey of the traffic signals on the major routes in the Portland region. This document contains information on operating agency, ownership, maintenance responsibilities, interconnections, coordination, controller types, and software types. The draft of the Corridor Assessments source book identifies traffic volumes and accident records for the major corridors in the region. Ultimately this document will include descriptions of the corridors, congestion locations during peak hours, accident "hot spot" locations, speed surveys, and corridor evaluations for existing and future conditions including problem area summaries with relationships to an ATMS plan. The Incident Management source book contains information on existing incident management activities in the Portland area, a framework for communication, and elements of an incident management traffic control plan. Other source books that will be completed with this project include an ATMS Primer, which will be the basis of the ATMS plan for the region, and an Institutional Framework, which will address interagency and other institutional issues.

START DATE: June, 1992

END DATE: July, 1993

STATUS: DKS and Associates, the contractor, has completed the data collection and a number of interim reports. Several meetings have taken place between the various participating agencies.

ESTIMATED TOTAL PROJECT COST: \$400,000

ANTICIPATED TOTAL FEDERAL SHARE: \$400,000

FEDERAL FUNDS THROUGH FY 92: \$400,000

CONTACT: Ed Fischer, FHWA Reg. 10, Oregon, HEO-010, (503) 326-2071

ROCHESTER, NEW YORK AREAWIDE EARLY DEPLOYMENT STUDY

DESCRIPTION: This project will provide direction for the design of an area wide advanced traffic management system which can be implemented within the next few years and which can be integrated with the existing computerized arterial signal system. The project consists of three tasks. The objective of Task I is to conduct an area-wide corridor assessment to inventory and identify existing congestion problems. This task will also evaluate freeway management techniques and detection technologies. Task II will review communication processes and incident response plan in order to develop a comprehensive incident management program. Task III will focus on overcoming the technical and legal stumbling blocks that impede the working relationship between area jurisdictions. This will be accomplished by identifying, prioritizing, and recommending solutions for inter-jurisdictional issues.

START DATE: Estimated: Late Spring 1993

END DATE: Estimated: Late Spring 1994

STATUS: Final RFP has been submitted from the NYSDOT Region Office in Rochester to the Main Office. Once the review is completed the RFP will be issued for offers. The consultant contract is, therefore, still a few months away. Study duration is expected to be 1 year.

**ESTIMATED TOTAL
PROJECT COST:** \$500,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$400,000

**FEDERAL FUNDS
THROUGH FY 92:** NA

CONTACT: Jonathan McDade, FHWA Reg. 1, New York, HPP-01, (518) 472-4253

ST. LOUIS, MISSOURI AREAWIDE EARLY DEPLOYMENT STUDY

DESCRIPTION: The objective is to utilize a consultant to develop a freeway management plan for the bi-state St. Louis area. This plan will incorporate IVHS technologies principally in the ATMS and ATIS areas. It will recommend specific strategies for incorporation into a comprehensive plan designed to meet future needs using IVHS technologies. The study will assess current operations such as the call box and emergency patrol operations. It will make recommendations for staffing structure and requirements. The study will recommend a future freeway management plan built around a basic framework. Elements to be considered in the plan include communications techniques, detection methods, information dissemination, ramp metering and cellular incident response.

START DATE: March 1, 1993 (anticipated)

END DATE: March 1, 1994 (anticipated)

STATUS: An RFP has been issued and proposals are due by January 27, 1993. The consultant selection committee, comprised of representatives from the Missouri Highway and Transportation Department (MHTD) and Illinois Department of Transportation (IDOT), is anticipating selecting the consultant in February and issuing a Notice to Proceed by March 1.

ESTIMATED TOTAL PROJECT COST: \$350,000

ANTICIPATED TOTAL FEDERAL SHARE: \$280,000

FEDERAL FUNDS THROUGH FY 92: \$280,000

CONTACT: Bruce Baldwin, FHWA Reg. 7, Missouri, (816) 926-7421

TAMPA, FLORIDA AREAWIDE EARLY DEPLOYMENT

DESCRIPTION: The project will develop an action plan for the implementation of an integrated transportation information center for the Tampa Bay area. The project will determine methods of obtaining real-time traffic condition data, integrating it into a reliable and continuous database, and disseminating condition information to the traveller in a useable and timely manner. The project is intended to result in an action plan which can be used for this implementation. The project contains six work tasks.

1. Establish a multi-agency project advisory group to oversee the project work.
2. Identify and evaluate the methods available for gathering real time traffic condition information.
3. Analyze control center alternatives, including location and operations.
4. Analyze various information dissemination techniques addressing multiple media applications.
5. Conduct a small scale market research effort to determine user preferences for interpreting traffic condition information.
6. Provide a final report consisting of technical memoranda and the recommended action plan. Also, a brochure **ORIENTED TO THE GENERAL PUBLIC** will be developed summarizing the project action plan.

START DATE: November, 1992

END DATE: November, 1993

STATUS: Task two will be completed by March 1993.

**ESTIMATED TOTAL
PROJECT COST:** \$100,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$80,000

**FEDERAL FUNDS
THROUGH N 92:** \$80,000

CONTACT: Patricia Harrison, FHWA Reg. 4, Georgia, HES-04, 404-347-4075

OTHER RELATED PROJECTS

DULLES AREA ADVANCED TRAVELER INFORMATION SYSTEM

LOCATION: Northern Virginia - Dulles Airport

PARTNERS: FHWA, Virginia DOT, Dulles Area Transportation Association (DATA), Metro Traffic Control, Town of Herndon

START DATE: 1991

END DATE: 1993

DESCRIPTION: This project will assess the commercial market potential for an Advanced Traveler Information System for the Dulles Airport area.

STATUS: The final report is expected to be completed and submitted to FHWA by the end of calendar year 1993.

ESTIMATED TOTAL PROJECT COST: \$200,000

ANTICIPATED TOTAL FEDERAL SHARE: \$200,000

FEDERAL FUNDS THROUGH FY 92: \$100,000

CONTACTS: James Robinson, FHWA Reg. 3, Maryland, HEO-03, (410) 962-3815

ELECTRONIC TOLL AND TRAFFIC MANAGEMENT

LOCATION: Major New Jersey toll roads

PARTNERS: FHWA, New Jersey DOT, New Jersey Expressway Authority, New Jersey Highway Authority, New Jersey Turnpike Authority

START DATE: 1992

END DATE: To be determined.

DESCRIPTION: The Electronic Toll and Traffic Management (ETTM) program will provide electronic toll collection equipment to the three New Jersey Toll Authorities. Implementation of ETTM technology will permit commuters to use "electronic tags" on their vehicles which will be recognized by tag readers located in the toll lanes. The New Jersey toll agencies are cooperating in an interagency effort also involving toll agencies from neighboring States, to develop a compatible region-wide ETTM system which will permit a motorist to use a singular electronic tag on any toll facility.

STATUS: Discussions regarding project concepts, scope, and schedule have been held with State staff. Execution of a cooperative agreement between FHWA and the New Jersey DOT to obligate Federal funds for the project is pending final review and acceptance by toll authority, state, and FHWA officials.

ESTIMATED TOTAL PROJECT COST: To be determined.

ANTICIPATED TOTAL FEDERAL SHARE: To be determined.

FEDERAL FUNDS THROUGH FY 92: \$25,000,000

CONTACTS: Jonathan McDade, FHWA Reg. 1, New York, HPP-01, (518) 472-4253

GOLDEN GLADES INTERCHANGE

LOCATION: Florida

PARTNERS: Florida Department of Transportation, FHWA

START DATE: 1992

END DATE: 1994

DESCRIPTION: The State of Florida will install advanced traffic management technologies at the Golden Glades Interchange on Interstate 95 in Dade County, Florida. Real-time monitoring and rapid verification of incidents will be provided with closed circuit television (CCTV), and variable message signs (VMS) will provide motorist information for this section of the freeway network.

STATUS: A cooperative agreement between the Florida Department of Transportation and the FHWA was executed in June 1992. Design for CCTV, VMS, and the communications elements has been initiated.

ESTIMATED TOTAL PROJECT COST: \$4,125,000

ANTICIPATED TOTAL FEDERAL SHARE: \$3,300,000

FEDERAL FUNDS THROUGH FY 92: \$3,300,000

CONTACT: Patricia Harrison, FHWA Reg. 4, Georgia, HES-04, (404) 347-4075

INTEGRATED CORRIDOR MANAGEMENT

LOCATION: New Jersey/Philadelphia

PARTNERS: FHWA, New Jersey DOT, Pennsylvania DOT (anticipated)

START DATE: 1992

END DATE: On-going

DESCRIPTION: It is expected that this project will be jointly pursued by New Jersey and Pennsylvania. Proposed project components include a multi-jurisdictional clearinghouse for regional traffic information, similar to the TRANSCOM operation in Northern NJ/NY, and a study of the overall traffic and incident management needs in southern New Jersey and the Philadelphia metropolitan area.

STATUS: A cooperative agreement providing Federal funding for the project was signed by FHWA and the New Jersey DOT on August 12, 1992. A consultant has produced draft materials focusing on overall needs, project issues, and possibly early action plan items.

ESTIMATED TOTAL PROJECT COST: To be determined.

ANTICIPATED TOTAL FEDERAL SHARE: To be determined.

FEDERAL FUNDS THROUGH FY 92: \$6,000,000

CONTACTS: Michael Halladay, FHWA Headquarters, HTV-20, (202) 366-6503

INTELLIGENT CORRIDOR PROGRAM

LOCATION: Florida

PARTNERS: FHWA, Florida Department of Transportation

START DATE: 1992

END DATE: 1994

DESCRIPTION: The Southeast Florida Intelligent Corridor System (ICS) is planned to eventually integrate elements of ATMS, ATIS, APTS, CVO, and AVCS. The extensive intermodal aspects of the I-95 corridor within Palm Beach, Broward, and Dade Counties will be a priority in the development of the ICS, and initial early implementation activities will be centered around the ATMS function. Park-and-ride lots, HOV lanes, commuter rail, heavy rail, bus, and connections to airport and seaport facilities all are present in the corridor. The overall goal of the project will be to provide real-time information to assist I-95 corridor travelers with guidance and mode decisions prior to and during a trip.

STATUS: A contract with JHK and Associates was initiated during the fall of 1992, and work is underway on a series of tasks including data collection, operational analysis of existing freeways, multimodal possibilities, communications and control center analysis, and a public information program.

ESTIMATED TOTAL PROJECT COST: To be determined.

ANTICIPATED TOTAL FEDERAL SHARE: \$1,700,000

FEDERAL FUNDS THROUGH FY 92: \$1,700,000

CONTACT: Patricia Harrison, FHWA Reg. 4, Georgia, HES-04, (404) 347-4075

MAGIC

LOCATION: Northern New Jersey

PARTNERS: FHWA, New Jersey DOT

START DATE: 1992

ENDDATE: 1994

DESCRIPTION: MAGIC (Metropolitan Area Guidance Information Center) was the name given to the initial core concept of a study initiated a number of years ago, which has expanded and evolved into a system of traffic surveillance and control and motorist information encompassing a nine-county region in northern New Jersey. The system will be designed to divert motorists from congested or emergency related areas to alternative routes. A multi-phased effort is planned by NJDOT, which will be coordinated with existing TRANSCOM activities and efforts in New York State.

STATUS: The MAGIC system is currently under design, with construction expected to begin in late 1993 or early 1994. A cooperative agreement obligating Federal funds for the project was executed by FHWA and the New Jersey DOT on August 12, 1992.

ESTIMATED TOTAL PROJECT COST: To be determined

ANTICIPATED TOTAL FEDERAL SHARE: To be determined

FEDERAL FUNDS THROUGH FY 92: \$4,000,000

CONTACTS: Jonathan McDade, FHWA Reg. 1, New York, HPP-01, (518) 472-4253
Gary Corino, FHWA New Jersey Division, HDA-NJ, (609) 989-2274
Richard Dube, New Jersey DOT, (609) 530-2448

MARYLAND ARTERIALS & BALTIMORE-WASHINGTON PARKWAY

LOCATION: Baltimore-Washington, D.C. corridor

PARTNERS: FHWA, Maryland State Highway Administration

START DATE: 1992

END DATE: 1994

DESCRIPTION: A comprehensive feasibility study for the Baltimore/Washington corridor is being proposed. Two areas will receive focus: future traffic management technology and future communications technology. Possible areas of study would include information dissemination using commercial television, automatic incident detection, further development of freeway incident management plans, and possible applications of coming IVHS technologies. In addition, efforts would concentrate on congestion management technology applied within the area where I-95 intersect both the Capitol Beltway (I-495) and the Baltimore Beltway (I-695). Both current needs and future advances would be met through inclusion of surveillance and communications in these areas.

STATUS: A contract that includes the Feasibility Study has been awarded to JHK and Associates.

ESTIMATED TOTAL PROJECT COST: \$3,225,000

ANTICIPATED TOTAL FEDERAL SHARE: \$2,500,000

FEDERAL FUNDS THROUGH FY 92: \$2,500,000

CONTACT: James Robinson, FHWA Reg. 3, Maryland, HEO-03, (410) 962-3815

MULTI-J-URISDICTIONAL LIVE AERIAL VIDEO SURVEILLANCE SYSTEM, I

LOCATION: Fairfax County, Virginia

PARTNERS: FHWA, Virginia DOT, Fairfax County Police, Virginia Transportation Research Council (VTRC)

START DATE: 1991

END DATE: 1993

DESCRIPTION: This project provides for field operational testing and evaluation of live video transmission from aircraft to traffic management centers. The project also evaluates the feasibility of transmitting to mobile command centers.

STATUS: System will be operational in February 1993, and a 6-month evaluation is planned.

ESTIMATED TOTAL
PROJECT COST: \$355,000

ANTICIPATED TOTAL
FEDERAL SHARE: \$355,000

FEDERAL FUNDS
THROUGH FY 92: \$355,000

CONTACTS: James Robinson, FHWA Reg. 3, Maryland, HEO-03, (410) 962-3815

MULTI-JURISDICTIONAL LIVE AERIAL VIDEO SURVEILLANCE SYSTEM, II

LOCATION: Montgomery County, Maryland

PARTNERS: FHWA, Maryland State Highway Agency, Montgomery County
Departments of Traffic and Police

START DATE: 1991

END DATE: 1993

DESCRIPTION: This ATMS field operational test project will test and evaluate the transmission of live video from aircraft to county and state traffic management centers in Maryland and Virginia. The feasibility of transmitting the live video to mobile command centers established at major incident scenes will also be tested. The cameras will be mounted on a fixed wing airplane operated by the Montgomery County Division of Traffic, and helicopters operated by the Fairfax County Police.

STATUS: The system is expected to be operational in April, 1993. A 6-month evaluation period will follow.

**ESTIMATED TOTAL
PROJECT COST:** \$400,000

**ANTICIPATED TOTAL
FEDERAL SHARE:** \$295,000

**FEDERAL FUNDS
THROUGH FY 92:** \$295,000

CONTACTS: James Robinson, FHWA Reg. 3, Maryland, HEO-03, (410) 962-3815

NEW JERSEY SIGNAL COMPUTERIZATION

LOCATION: New Jersey

PARTNERS: FHWA, New Jersey Department of Transportation

START DATE: 1992

END DATE: On-going

DESCRIPTION: This project will provide coordinated signal systems utilizing advanced traffic control software and video surveillance.

STATUS: A cooperative agreement has been executed between FHWA and New Jersey DOT to provide funding for the project. Design of a 16 intersection system on New Jersey Route 178 has been approved, and construction should begin in early 1993. This first system will use OPAC software and will include three surveillance courses.

ESTIMATED TOTAL PROJECT COST: \$6,000,000

ANTICIPATED TOTAL FEDERAL SHARE: \$6,000,000

FEDERAL FUNDS THROUGH FY 92: \$6,000,000

CONTACTS: Jonathan McDade, FHWA Reg. 1, New York, HPP-01, (518) 472-4253

TRAFFIC ENGINEERING INFORMATION DATABASES

DESCRIPTION: This project will lead to the development of requirements for databases which contain information on traffic simulation software (e.g., NETSIM, Highway Capacity Manual) and research, development and support activities related to this software and other IVHS-related traffic operations issues (e.g., demand and incident management).

START DATE: To be determined.

END DATE: To be determined.

STATUS: An RFP is scheduled to be issued by January or February, 1993.

ESTIMATED TOTAL PROJECT COST: NA

ANTICIPATED TOTAL FEDERAL SHARE: NA

FEDERAL FUNDS THROUGH FY 92: NA

CONTRACTOR: To be determined.

CONTACT: Dan Schierer, FHWA Headquarters, HTV-32, (202) 364672

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